

FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

Feb. 25 ...	Lecture, "Commercial Aeroplane and Seaplane Transport," by H. White Smith, and "Commercial Airship Transport," by C. I. R. Campbell, at Lecture Hall, Olympia
Mar. 3 ...	Lecture, "Airship Fabrics," by J. W. W. Dyer, before R.Aë.S.
Mar. 3 ...	Lecture, "Parachutes," by Maj. T. Orde-Lees, before R.Aë.S.
Mar. 9 ...	Lecture, "The Artificial Control of Weather," by Sir Napier Shaw, before Cambridge University Aë.S.
Mar. 17 ...	Lecture, "Flying Boat Construction," by Capt. D. Nicholson, before R.Aë.S.
Mar. 20-22	Aero Club of France Grand Prix. 2nd stage
April 13-20	Monaco Seaplane Meeting
April 20-22	Aero Club of France Grand Prix. 3rd stage
June 1 ...	Entries Close for Schneider Cup
June 10 ...	Race, Lugo-Trieste-Trieste-Lugo
Sept. 5 ...	Pulitzer Trophy, Detroit, U.S.A.
Sept. ...	Gordon Bennett Balloon Race
Sept. 30 ...	Provisional Date for Schneider Cup

Should any difficulty be experienced in procuring "FLIGHT" from local news-vendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.

INDEX AND TITLE PAGE FOR VOL. XII.
The 8-page Index for Vol. XII of "FLIGHT" (January to December, 1920) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1/- per copy, post free.

EDITORIAL COMMENT



URING the recent debate on the Address, a most interesting discussion took place in the House of Commons on the need for co-ordination between the fighting Services. Major-Gen. Sir J. Davidson moved an amendment, regretting that no reference was made in the Speech from the Throne to the very urgent need for co-ordinating the problems and tasks of the Navy, the Army and the Air Force for purposes of defence of the British Empire as a whole and for the establishment of machinery to give effect thereto. He advocated for the purpose a Ministry of Defence, composed of the representatives of the Admiralty, the War Office and the Air Ministry to sit for the solution of problems in a logical way. The amendment was seconded by Lieut.-Gen. Sir A. Hunter-Weston in a very able speech, in which he pointed out that if it was necessary to co-ordinate the Services when motion was confined to two dimensions in a horizontal plane and when our fighting was done only on land and sea, it is ever so much more essential now when movement is in three dimensions, and when we fight not only on sea and land, but below the surface of the sea and above both land and sea in the air. Very truly he said that the air is necessary to the sea and the land, but the land is also necessary to the air. Although it is true that the independent action of aircraft will become an increasing factor in war, yet the Air Force cannot exist in the air; it must always be largely dependent upon the land, and, for certain operations, on the sea. Owing to the intervention of the air, the connection of the three services has become inextricably mingled, and to allow them to go on without some co-ordinating organisation is to make sure of both inefficiency and extravagance. He agreed that a Ministry of Defence would be the

most logical solution of the difficulty, and will probably be the best solution when the Government is re-formed on more efficient lines by having Cabinet Ministers who are responsible for policy, and who have acting under them groups of Ministers, each Department in charge of a Minister responsible to Parliament for the administration of the service. In the meantime, he favoured the formation of a small Commission, similar to the Esher Commission of 1904, to review our military machine generally and to suggest to the Government modifications to that machinery, leading to increased efficiency, to a reduction in the number of staff officers, and to a great economy in money.

Gen. Seely supported the amendment in general terms, and in the course of his speech appealed to the Prime Minister to tell the House that the experiment of combining the War Office and the Air Ministry had come to an end, and that the three Services, as Parliament said they should be, are distinct Services with proper means of co-ordination.

The Premier's Reply

In the course of his reply, the Prime Minister put his finger straight on to the weak spot of the scheme of a Ministry of Defence—a weakness to which we ourselves drew attention some weeks ago when discussing this same subject. In principle, he agreed that a Ministry of Defence was the only really effective and direct method of dealing with the problem, but pointed out that very much would depend upon who the Minister had advising him in any particular Department. If there was a strong man in any one Department, the Minister might lean too much toward that Department. It might be to the Navy or to the Army. Unless there was a very strong Minister of Defence, there would be a real danger that a good "wangler" in any Department would manage somehow or other to get his own Department attended to at the expense of others. He went on to forecast the formation of a Committee analogous to the War Cabinet, composed of the Ministers representing their Departments and their experts, with another Minister in the Chair, to deal with the problems of co-ordination.

Mr. Lloyd George emphasised that this is not merely a problem for England; it is an Imperial problem. He looked forward, he said, to the meeting of the Prime Ministers of the Empire which will take place in June as an occasion for raising the whole problem of Imperial defence. There must be co-ordination between the Services, but there must also be co-ordination between the various parts of the Empire. He made no reference to the question put by Gen. Seely as to the termination of the experiment of combining the War Office and the Air Ministry.

On the whole, we regard the result of the debate with satisfaction. We have never been particularly enamoured of the idea of grouping the three Services under a single Minister of Defence, for the reason we have already given, and which was urged by the Prime Minister as a vital objection. By far the better solution is that of the Committee of Defence, sitting in permanent session and able to visualise warlike operations as a whole, and then, having arrived at a decision, able to enforce its requirements equally upon the three fighting Departments who would be charged with carrying out the designed task as a correlated operation. The Committee

would work somewhat like this: The first of its tasks would be concerned with armaments, and to arrive at a proper appreciation of what we require for purposes of defence or offence. It would have, with due regard to the political outlook, to take stock of what possible conflicts we might become involved in. Then, in detail the question for discussion would be: War breaks out between this country and Redland. First, what are we going to do, and then what material and *personnel* do we require to do it. That then becomes a matter for the experts of the three Services, who agree on what the probable rôle of each will be in such an event and what each requires to carry it out in co-operation with the others. By that means an estimate of cost can be arrived at and Estimates prepared for submission to the House co-ordinated to the hypothetical task for which the country has to be ready. Without such co-ordination, each Department visualises war from its own separate and individual point of view and without any but the slightest relation to the rôle that will be assigned to the others in the event of war becoming an actuality. Obviously, the latter must lead to inefficiency and extravagance. The alternative, which we are glad to know is to be adopted, makes for higher efficiency at a less cost to the taxpayer.

Wanted— An Air Policy

It is all very well to talk about co-ordinating the three Services, but what is required now more than anything else is a real air policy. We see the deplorable results of delay and parsimony in the shape of a rapidly waning aerial transport industry. It is true that all the records of commercial aviation show that traffic is increasing rapidly between this country and the Continent, but at the same time it is a shameful fact that the increase is to be credited to foreign enterprise, while British machines are disappearing from the cross-Channel services. As an earnest of this, it may be noted that during the period from the 7th to the 13th inst. there were 13 aeroplane arrivals and departures from the London terminal aerodromes, to and from the Continent, with passengers, goods and mails. Of these machines, five were operated by the Syndicat National pour l'Etude des Transports Aériens, five by the Messageries Aériennes, and three by the Compagnie des Grands Express Aériens. Not a single machine of British nationality either left or arrived at the London air-ports.

The basic reason for this is that we have no aerial policy, and the Government even now seems unready to formulate one. Contrast this with what our rivals are doing to secure and maintain a lead in the air.

On April 1 all the French cross-Channel air services will reduce their passenger rates to £5 for the single journey—half the present cost of travel by air between London and Paris. This "cut" has been made by direction of the French Government, and is a direct first consequence of the increased rates of subsidy offered to civil air service enterprises.

It is easy to see what must inevitably happen unless something is done here to level matters up. The Cie, des Grands Express Aériens, which is one of the three French lines operating services between the two capitals, is building giant machines—one of which is nearly ready now—capable of carrying twenty



Aviatic Types—Civil and Otherwise

THE ROYAL AERO CLUB

passengers and some 1,000 lb. of goods. Supposing this machine to make 170 flights with full loads it would alone earn an amount of subsidy equivalent to the whole subsidy grant allocated by our own Government for the assistance of civil aviation. It is perfectly obvious that the British cross-Channel services cannot live for a moment in the face of such competition as these figures show they will have to encounter during the coming summer—assuming that the companies concerned decide that it is worth while to try to meet it at all.

What the British Government has to do—and that without delay—is to take a decision on the question of whether or not this country is to remain an aerial Power. If we are not—if the game is not worth the candle—then let us know it at once and close down all effort, and let aviation, civil and military, achieve the happy despatch. It will be far better than a lingering death, and those who are at present wasting time and effort in the attempt to foster aviation can turn their attention to more profitable pursuits. But if the contrary opinion prevails, and it is decided that we *do* need to hold our

own in the air—that all the experts, naval, military and civilian, are right about the bearing of aerial development upon questions of defence—then equally let the country be told, and further be told what it is going to cost. Then let us get down to the task of encouraging and fostering the growth of aviation by every means possible. It will cost a great deal of money. It will mean heavy subsidies to aerial transport enterprises and to constructors, but it will be worth while in the end. France realises it. Germany has recognised it and is preparing large plans for the future development of flying. They are both prepared to spend large sums of money on the task, and we have got to face the same expenditure, whether we like it or not—or watch the nation fall hopelessly behind in the air. What are a few millions now in comparison with what we shall ultimately have to spend in order to make up lost time in the day of wrath? We know what unpreparedness cost us in the World War. The basic question which has to be answered now is: Are we to face the same contingency again, this time with our eyes wide open?



SIR ROSS AND SIR KEITH SMITH RETURN TO ENGLAND

WHEN the two Australian brothers started out in 1919—November 12 to December 10—for their great flight to Australia, they departed with but little blare of trumpet and were content, being the most modest of men, to let their deeds claim their just reward "after the event." So it comes about that now they have returned to England they have, as a preliminary to a great "aerial campaign" through the country, to submit to the usual acknowledgments of their great pioneer work in the form of functions of congratulation from various official bodies concerned with matters aeronautical.

On their way across they dropped into the French Aéro Club in Paris, where on February 15, at a reception in their honour, they were presented by M. Michelin, President of the Club, with commemorative medals, M. Michelin describing the flight as the greatest in the history of aviation.

On February 18 Sir Ross and Sir Keith Smith were, at the Savoy, the guests at luncheon of Major-General Sir Frederick Sykes, Controller-General of Civil Aviation. Among the guests were Col. Amery, Under-Secretary for the Colonies, Sir Edward Lucas, Agent-General for South Australia, Maj.-Genl. E. D. Swinton, Sir Vincent Caillard and Gen. W. B. Caddell, of Messrs. Vickers (whose machine, the "Vickers-Vimy Rolls," was used by the airmen), Mr. Claude Johnson, of Messrs. Rolls-Royce, Ltd., and the Dutch Naval Attaché,

whose Government in the Dutch East Indies gave great assistance in the flight.

This week the brothers are the Guests of Honour on Wednesday of the Overseas Club and Patriotic League at the Hyde Park Hotel, when Maj.-Genl. Seely, C.B., will preside, and on Thursday at the Connaught Rooms the Hosts will be the Imperial Air Fleet Committee, with Lord Desborough, the President, in the chair.

Another recognition of this pioneer flight is the presentation which is to be made by the Royal Aero Club of gold medals to Capt. Sir Ross Smith and Lieut. Sir Keith Smith and bronze medals to Sergt. J. M. Bennett and Sergt. W. H. Shiers.

As probably two of the finest exponents of living efficiency it was perhaps appropriate that one of their first "appearances" after their arrival should have been at the Efficiency Exhibition at Olympia, where Sir Ross and Sir Keith Smith were the guests of Sir Charles Wakefield.

Commencing on March 7 at the Philharmonic Hall, Sir Ross Smith and his brother will be continuing their splendid work for aviation by giving a series of lectures upon their experiences during their flight to away underneath. Photographs *en route* will be a great feature of the entertainment, and it will be difficult to imagine any more interesting and unique subject than the adventures of these pioneers. Their tour round the country should go far to bring home to the public the enormous importance and commercial possibilities of aviation.



D.F.C. for King Albert of Belgium

THIS week the Duke of York is due at Brussels, where he will be the guest of the King and Queen of Belgium. The Duke is conveying to King Albert the Distinguished Flying Cross. General Sir Frederick Sykes is down to give a lecture on Thursday this week, at the Aero Club of Belgium, on "Aviation and its Progress during the War and the Peace" at which King Albert was to be present.

General Sykes is over at Brussels following his attendance as British representative at the Paris Anglo-France-Belgium Air Conference.

French Air Attachés

SOME of the Air Attachés' appointments by France are announced. These include, Lt. Sable at the French Embassy, who now represents French Aeronautic interests in London; at Rome, Commandant Reimbert; Madrid: Capitaine Bizarré; Pekin: Capitaine Roques; Stockholm: Commandant de Serre; Bruxelles: Commandant Massol; Tokio: Commandant Leblanc; Washington: Capitaine de Lavergne.

The Giant Caproni

As briefly recorded last week, the new Italian giant

machine about which rumour has been busy is the Caproni triplane, in which the wings are arranged in three sets of triplane structures, one behind the other. The *fuselage* is a huge affair, and forms in reality the boat hull of the machine. It is said to have room inside for 100 passengers, and in view of the arrangement of the wings, the passengers can be spread out longitudinally over the entire length of the hull. How such a machine is going to get off and, if it does, how it will handle in the air, is another matter. It is, of course, to be presumed that wind tunnel model tests have been made before a machine of this size was built, but judged by all ordinary standards the machine looks a freak.

The power is provided by eight engines of 500 h.p. each, so that the machine has a matter of 4,000 h.p. or 40 h.p. for each passenger carried. As the speed is not expected to be more than about 100 m.p.h., this should be possible, especially as the triplane structure is probably not very heavy, although, judging from illustrations, it has a good deal of head resistance. It is rumoured that if the trials, which are to take place shortly, are successful, an attempt will be made on flying across the Atlantic.

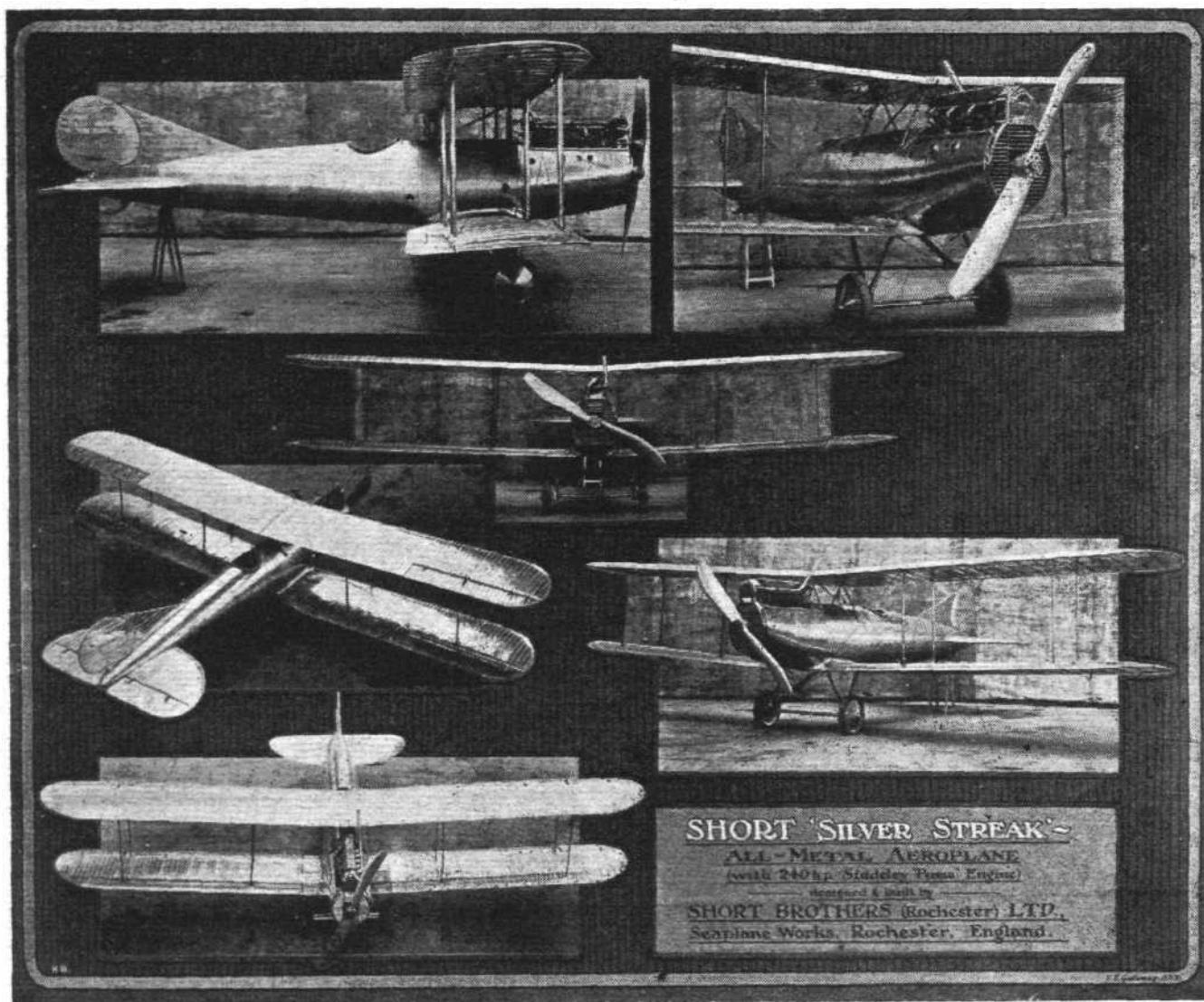
AIR MINISTRY ACQUIRE SHORT "SILVER STREAK"

As briefly recorded in our issue of last week, the Short all-metal aeroplane "Silver Streak," which was exhibited at the last Olympia Aero Show, has been purchased by the Air Ministry. This machine, it may be remembered, aroused very great interest at Olympia on account of its unusual construction. Not only was the entire framework of the machine manufactured from metal, steel and Duralumin, but even the wing and fuselage covering were of metal. The "Silver Streak" is therefore a truly all-metal machine, and as such is of more than passing interest. Although the machine was described in our columns at the time of the show, it may not be without interest briefly to recapitulate its main features.

The fuselage is built up in the form of a framework of channel section Vickers Duralumin members, the whole structure

main dimensions of the machine are: Span, 39 ft. Length overall, 26 ft. 6 ins. Chord, 5 ft. 3 ins. Gap, 5 ft. 1 in. Area, 368 sq. ft. Petrol capacity, 50 gals. Oil capacity, 6 gals. Weight empty, 1,865 lbs. Weight fully loaded, 2,670 lbs. Load per h.p., 10.27 lbs. Load per sq. ft., 7.22 lbs. Maximum speed about 120 m.p.h. Cruising speed 90 m.p.h. Range, 260 miles at full power, 450 miles at cruising speed. Endurance, 3 hours at full speed, 5 hours at cruising speed. Climb, 10,000 ft. in 11 minutes.

We do not know what tests the Air Ministry intend to carry out with the "Silver Streak," but it is to be hoped that the machine will be given a good deal of flying so as to determine such points as the effect on the metal structure of vibration, the manner in which the aluminium covering stands up to the effects of moist air, in short, whether this form



PURCHASED BY THE AIR MINISTRY: The Short "Silver Streak," which was exhibited at the last Olympia Aero Show, was delivered to one of our flying stations recently, as announced last week

being covered with thin sheets of the same material. The channel and angle sections are riveted to the covering, thus forming a complete unit. The wings have tubular spars and tubular drag struts, with streamline tubular interplane struts. The wing bracing is in the form of stranded cables, with Short pattern adjustable ends.

The sheet aluminium covering is fluted at intervals of approximately 3 ins. to give greater stiffness, and is quite thin, 26 gauge to be exact. The ribs are sheet Duralumin and have small flanges projecting vertically, to which the bent-up flanges of the covering are riveted.

The engine fitted is a Siddeley "Puma" of 250 h.p., mounted on built-up box section cradles. Great care has been taken in the arrangement of the petrol system, all petrol pipes being of steel and without any rubber joints. The

of construction compares favourably or otherwise with ordinary wood and fabric construction. It would be of interest to know to what extent the metal covering helps in taking stresses, but this would probably mean destruction tests, and until other points have been determined it seems a pity to destroy the machine in this manner, even if useful data did result.

In any case, it is gratifying to know that the authorities have purchased the machine and intend to test it thoroughly. At present very scant data are available regarding the behaviour of a metal aeroplane under actual working conditions, and if the tests on the "Silver Streak" help to widen our knowledge of this subject, it will be to the benefit of future aviation, in which metal construction will undoubtedly play an important part.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

THE Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Wednesday, March 30, 1921, at 3, Clifford Street, New Bond Street, London, W.1, at 6 p.m.

Notices of Motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the Meeting, and must be signed by at least five Members.

Committee

In accordance with the Rules, the Committee shall consist of 18 Members. Members are elected to serve for two years, half the Committee retiring annually.

Retiring Members are eligible for re-election.

The retiring Members of the Committee are:—

Lieut.-Col. John D. Dunville.
Lieut.-Col. Spenser D. A. Grey, D.S.O.
Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.
Squadron-Leader T. O'B. Hubbard, M.C., R.A.F.
Lieut.-Col. F. K. McClean.
Air-Commodore E. M. Maitland, C.M.G., D.S.O., R.A.F.
The Viscount Northcliffe.
Lieut.-Col. Alec Ogilvie.
F. Handley Page.

Any two Members of the Club can nominate a Member to serve on the Committee, provided the consent of the Member has been previously obtained. The name of the Member thus nominated, with the name of his proposer and seconder, must be sent in writing to the Secretary not less than fourteen days before the Annual General Meeting.

THE FLYING SERVICES FUND

(Registered under the War Charities Act, 1916)

Administered by the Royal Aero Club

For the benefit of Officers, Non-Commissioned Officers and Men of the ROYAL AIR FORCE who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

Honorary Treasurer:

The Right Hon. LORD KINNAIRD.

Committee:

H.R.H. THE DUKE OF YORK, K.G. (Chairman).
Lieut.-Col. A. DORE, D.S.O.
Mr. CHESTER FOX.
Squad.-Leader T. O'B. HUBBARD, M.C., R.A.F.
Group-Capt. C. R. SAMSON, C.M.G., D.S.O., R.A.F.

Secretary:

H. E. PERRIN.

Bankers:

Messrs. BARCLAYS BANK, LTD., 4, Pall Mall East, London, S.W. 1.

Subscriptions

	£	s.	d.
Total Subscriptions received to February 11, 1921	17,184	3	1
His Royal Highness the Duke of York, K.G.	21	0	0
Total, February 21, 1921	17,205	3	1

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

THE ROYAL AIR FORCE MEMORIAL FUND

A MEETING of the Executive Committee of the above Fund was held at the Offices of the Fund, 7, Iddesleigh House, Caxton Street, S.W. 1, on the 17th inst., Lord Hugh Cecil in the Chair. The Members of the Committee present included, Air Vice-Marshal Sir John Salmond, Air Vice-Marshal A. V. Vyvyan, Air-Commodore Brooke-Popham and Longcroft, H. E. Perrin, Esq., and W. S. Field, Esq.

A list of grants made since the same date, amounting to £157 11s. 8d., were approved as grants to the rank and file and their dependants.

The Secretary reported that the balance of the Royal Air Force Aids Committee amounting to slightly over £22,000, was about to be handed over for the use of the Fund.

A sub-committee under the Chairmanship of Air Vice-Marshal A. V. Vyvyan was constituted to deal with proposals for assistance to the post-War Air Force of all ranks.

Considerable discussion was given to the Royal Air Force War Memorial. A site, one of three suggested by the First Commissioner of Works, and situated at Whitehall Stairs, on the Middlesex side of the Thames Embankment, midway between Westminster Bridge and Hungerford railway and foot bridge, was regarded as very suitable for the purpose, and the London County Council have been asked to give the Committee the option of this site, so soon as full details of the nature and form of the Memorial can be submitted to them for approval. Meantime the Chairman was requested to consult Sir Aston Webb, asking his device as to the form and nature of a suitable Memorial to the Officers and Airmen of the Royal Air Force who fell in the Great War.

Sir John Salmond, Chairman of the sub-committee, dealing with the Vanbrugh Castle scheme for a Boys' Home, reported that the work of renovation was in progress. It should be noted that the Deed of Conveyance making over the property for the use of the Committee as a Home for Sons of Airmen, has been executed by Mr. Alexander Duckham, and the benefit

has been accepted on behalf of the Fund, by the Trustees. Viscount Cowdray, Lord Hugh Cecil, and Sir Hugh Trenchard.

The two houses at Ascot, namely, "Woodcote" and "Heathend," generously bequeathed to the Air Council by Mrs. M. E. Salting, and which are to be sold, the proceeds coming to this Fund for the purchase of Scholarships for the sons of deceased Officers, R.A.F., will be put up for sale by Messrs. Hampton and Sons, of 3, Cockspur Street, S.W., on April 19 next, unless in the meantime sold by private contract. A substantial sum, it is earnestly hoped, will accrue to the Fund from his source.

Correspondence submitted by Air-Marshal Sir Hugh Trenchard was read concerning his recommendation to the Soldiers and Sailors Families Association, and to the Soldiers and Sailors Help Society that they would find themselves able to include in their titles the word "Airmen." Both these organisations replied to the Air-Marshal, and signified their willingness to carry this out, so soon as the necessary formalities could be taken. Both these organisations have given valuable assistance to this Fund, and it is felt that the addition to their titles will be of further benefit to all concerned.

The Flying Services Fund administered by the Royal Aero Club, signified their desire that now that this Fund's organisation was in working order, the Royal Air Force Memorial Fund should carry out all work connected with future assistance to deserving cases in the Royal Air Force.

	£	s.	d.
Amount of donations and subscriptions announced up to January 20, 1921	103,377	2	11
Amount of donations and subscriptions received up to February 16, 1921	1,978	6	0
Total	105,355	8	11

The Malmo and Warnemunde Air Service

THIS air mail service, which last year was carried on through a Swedish company, looks like being re-opened under the auspices of the Nordiska Luftrederei A/B, who are endeavouring to arrange with the Swedish Government for 1921. Originally a subsidy of Kr. 1,000 per flight was

asked for, but the new company are prepared to carry on at half that amount per return flight, carrying a postal weight of 150 kilos., subject to this weight not exceeding one cubic metre in bulk.

The proposition appears as if it were to be favourably considered.

NOTICE TO AIRMEN

France—Aerodromes and Seaplane Stations, Etc.

1. NOTICES to Airmen Nos. 98 and 111 of 1920, are amplified and amended as follows:—

2. Aerodromes and Seaplane Stations.

(i) VILLACOUBLAY.—(a) The construction of a concrete platform in the N.E. position of the aerodrome is to be commenced very shortly. Pilots should therefore avoid this danger area, the boundaries of which will be marked as clearly as possible by strips of canvas and red and white flags. (b) Villacoublay is a private civil aerodrome owned by the Soc. An. des Aéroplanes Morane-Saulnier, and is situated 2 kms. West of Villacoublay village and 6 kms. E.S.E. of Versailles, Latitude $48^{\circ} 46' N.$, Longitude $2^{\circ} 12' E.$

(ii) BORDEAUX (TEYNAC). (Latitude $44^{\circ} 50' N.$, Longitude $0^{\circ} 42' W.$ Markings: The centre of the landing zone on this aerodrome is marked with a white circle of 50 metres diameter, situated 400 metres, 198° (approx. S.S.W.) from the W/T mast.

(iii) MONTPELLIER. (Latitude $43^{\circ} 32' N.$, Longitude $3^{\circ} 53' E.$) As a result of recent floods the civil emergency landing ground at Montpellier has become unfit for use by aircraft, and should therefore no longer be used. (Note. Para. 1 of Notice to Airmen No. 111, of October 22, 1920, is amended accordingly.)

(iv) BAYONNE. Civil seaplane station. Position: Latitude $43^{\circ} 31' N.$, Longitude $1^{\circ} 30' W.$ Situated 3 kms. north of Bayonne. Accommodation: There are two hangars and one slipway available.

3. GENERAL.—When any work is in progress at a French State civil aerodrome, which renders part of such aerodrome unfit for use by aircraft, the boundaries of the dangerous zone will be marked by means of red and white strips laid flat on the ground and by red and white flags.

4. AUTHORITY.—For para. 2 (i), sub-section (a), French Notice to Airmen No. 22, of January 14, 1921. For remainder (excepting para. 2 (i), sub-section (b))—"Bulletin de la Navigation Aérienne," No. 10, January, 1921. (No. 18 of 1921).

NOTICE TO GROUND ENGINEERS

Interplane and Centre-Section Struts: Rotting in Lower Sockets

1. In several instances recently it has been noted that the lower ends of wooden interplane and centre-section struts have rotted in the sockets, due to prolonged exposure of the aircraft to the weather under winter flying conditions.

2. The attention of Ground Engineers is therefore directed to the necessity of a careful examination of this portion of all such struts.

3. The tendency of the strut end to rot can be materially reduced by providing some arrangement to prevent water from entering the socket, thus obviating constant contact between moisture and the end grain of the strut. (No. 18 of 1921.)

Top Overhaul of Engines After Storage

All engines that have been in storage or unused in machines for more than three months since previous running, as recorded in the log-book, should be subjected to top overhaul before being passed by the Ground Engineer for

flight. The internal condition of the engine should be carefully examined for signs of corrosion, particular attention being paid to cylinder bores and all ball and roller bearings.

In addition to the usual precautions taken after top overhaul to ensure that all parts of the engine, including ignition and carburation systems, function correctly, special attention should be given to the flushing of all oilways—flushing, cleansing, adjustment, refilling, etc., of lubricators, filters, etc. (No. 19 of 1921.)

CIVIL FLYING PROGRESS

THE following returns—furnished voluntarily by the firms engaged in air transport—showing the progress made since the opening of Civil Aviation in May, 1919, are announced by the Air Ministry:—

	Quarter ending Dec. 31, 1920.	Quarter ending Dec. 31, 1919.	Totals from May, 1919, to Dec., 1920.
No. of machine flights ..	3,524	4,170	62,003
No. of machine hours flown ..	2,125	1,852	19,952
Average duration of each flight (mins.) ..	36	26	19
Approx. machine mileage ..	175,000	138,000	1,556,000
No. of passengers carried ..	6,427	6,284	106,712
Weight of goods carried (in tons)	34½	9½	167
<i>Accidents</i>			
Flying accidents resulting in death to one or more occupants of machine ..	1	2	8
Non-fatal flying accidents resulting in injury to occupants of machine ..	1	—	18
Flying accidents resulting in death of third party ..	—	—	1
Non-flying accidents resulting in injury of third party (propeller accident) ..	—	—	1
Flying accidents not involving injury to personnel ..	1	3	20
	3	5	48
<i>Casualties to personnel</i>			
Pilots killed ..	1	2	8
Pilots injured ..	1	—	14
Passengers killed ..	3	1	11
Passengers injured ..	1	—	16
Third party killed ..	—	—	1
Third party injured ..	—	—	1

Accident and casualty rates from May, 1919, to December, 1920:—

Machine miles per flying accident ..	33,100
Machine flights per flying accident ..	1,319
Machine hours per flying accident ..	424
Passengers killed per 1,000 carried ..	0.1
Passengers injured per 1,000 carried ..	0.15

Reward for Trawler Skipper and Crew

THE Air Ministry announces that the Air Council have awarded a silver cup and a sum of money to Mr. William Kennedy, skipper of the steam trawler Sea Searcher, of Hull, and a sum of money to the mate and each member of the crew in recognition of their services to the Royal Air Force pilot and observers of aeroplane D H, 9A, 3518, which fell into the sea off Duncansbay Head on October 6, 1920.

Navy and Army Canteen Board Goes; Service Institutes Take Charge

AN Army Council instruction states that the Navy, Army, and Air Force Institutes will replace the Navy and Army Canteen Board, and will for the future be responsible for the conduct of all naval, military, and Air Force institutes in the United Kingdom and in garrisons overseas, and of canteens in His Majesty's ships. With a view to fostering close and friendly relations between the Army and the new organisation, it has been decided that the existing Command Canteen Committee, under the name of Command Institutes Committees, will continue, and that, in addition, an Army Institutes Committee will be established, consisting of

officers nominated by the Army Council and of one officer and one other rank from each command in the United Kingdom, representing their respective Command Institutes Committees.

At the same time it is announced that the N. A. and A. F. Institutes have decided to sell their surplus properties, and have instructed Messrs. Knight, Frank, and Rutley to offer the same by auction. The sale will include the provision depot in Regency Street, Westminster, which was for some time in the occupation of the Australian Expeditionary Force. This property has an important building area of about 21,000 ft, with lifts to each floor. The warehouses in Queen Street, Dover, and in High Street and Nelson Street, Aldershot, will also be sold at the same time.

Paris-Geneva Air Line

M. BUISSON, director of the *Vie Aérienne*, is at the head of a company which has acquired the air transport enterprise founded last July by the two air pilots, Minier and Durafour, for operating the Geneva-Paris and Geneva-Lyons air line. It is proposed to restart a regular service this year.

THE HANDLEY PAGE WING

BY F. HANDLEY PAGE

THE paper to which everyone interested in aviation has long been looking forward was read by Mr. Handley Page on Thursday of last week (February 17), before the Royal Aeronautical Society. There was a very good attendance at the lecture, which was followed by an interesting and instructive discussion. Giving as it does, for the first time, a full account of the results obtained with the new H.P. wing, we publish Mr. Handley Page's paper in full, and we feel that we need not make any apology for doing so. The paper is one of most unusual interest, and it may well be that the Handley Page discovery will have the most far-reaching effect upon the future of commercial aviation. The following is the full text of the paper.

The present Paper is a record of experimental work carried out with a view to overcoming the phenomenon of "burbling." As is well known, the total pressure on an aerofoil is the sum of the positive pressure on the under side and the negative suction on the upper. If this negative suction can be made to increase progressively with increasing angle of incidence

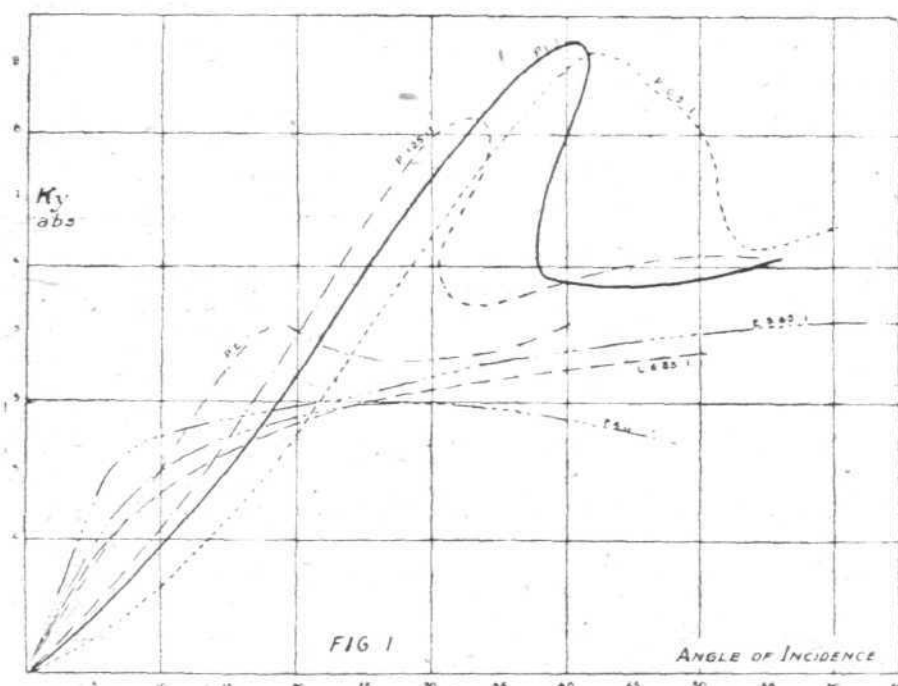
on the back of the plane, and the pressure increases continuously as some function of the angle. At angles greater than this critical value the air leaves the back of the plane, a 'dead' air region is formed there, and any reduced pressure or suction on the plane back tending to increase the total 'lift' is then solely due to the drag of the 'live' air stream at the edges of this 'dead' air region."

A further reference† was made later on in the Paper:—

"The critical angle at which the 'live' air leaves the plane back is reached earlier in the case of planes of high aspect ratio, and the latter accordingly do not have such high maximum values as the planes of lower aspect ratio."

"With planes of high aspect ratio there is not the same facility for the 'feeding in' of fresh air at the plane sides to act as a link between the plane and 'live stream,' and therefore the 'live stream' leaves the plane back at an earlier stage than in the case of the plane of lower aspect ratio."

In Fig. 1 is the set of curves reproduced from the 1911 Paper, showing the pressure on aerofoil as a function of the



to angles greater than heretofore, the maximum value of the aerofoil lift coefficient will be increased. The effect of such an increase on aeroplane design depends upon the magnitude of the increase and the extra structure weight of the device necessary to obtain it. The present method which is now described has been evolved from experimental data, and an outline of the results is given below.

In a Paper which I read before the Royal Aeronautical Society in April, 1911—ten years ago—I attempted an analysis of the somewhat meagre results then available on the pressures on plane and curved surfaces moving through the air. The effect now known as "burbling" was referred to as follows:—

* "To obtain a law giving the normal pressure on a plane as a continuous function of the angle of incidence of the

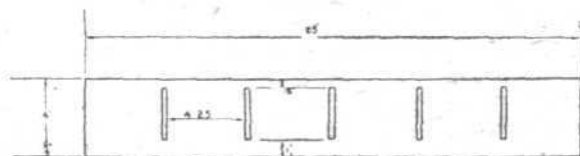


FIG. 2.

H.P. aerofoil with five longitudinal slots

impinging air from 0 to 90 is impossible owing to the two distinct forms of flow that occur on the back of the plane. From the horizontal position of the plane up to an angle varying in magnitude from 10° to 50° depending on the aspect ratio, shape and curvature of the plane, the air hugs the back of the plane, the suction due to the rushing air is felt directly

* "The Pressures on Plane and Curved Surfaces Moving Through the Air."—"Aeronautical Society of Great Britain Journal." April, 1911. Page 48.

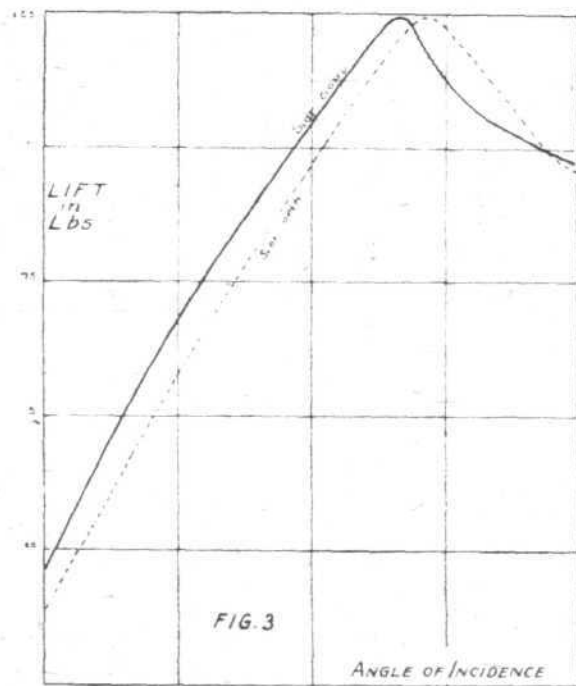


FIG. 3

angle of incidence. It will be observed that the square aerofoil marked P. 1:1 continues lifting until 40°, whereas the aerofoil of aspect ratio 6.25:1 (marked L. 6.25:1) "burbles" between 10° and 15°. If, then, it were possible to convert the high aspect ratio aerofoil into a series of square ones and maintain the same conditions as in a square plane, higher maximum lift coefficients should be obtained.

Fig. 2 is an aerofoil of aspect ratio 6½ converted into six square planes by five slots, each parallel to the chord of the plane. With the slots open the total "lift" on the plane

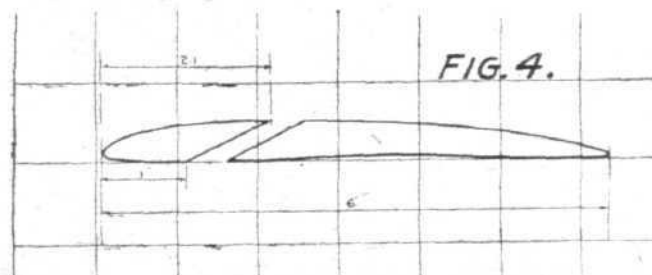


FIG. 4.

Plane section with early type slot

was slightly increased, and the "burble" took place at 14° instead of 13° (see Fig. 3).

Improved results were later obtained with this form of slot, but this line of investigation was abandoned in favour of a transverse slot (see Fig. 4), which was tested on an aerofoil of R.A.F./15 section (see Fig. 5). The shape of the

† "The Pressures on Plane and Curved Surfaces Moving Through the Air."—"Aeronautical Society of Great Britain Journal." April, 1911. Pages 55 and 56.

slot, the width of the two openings and the position of the forward small aerofoil, and many other details, were found to have a very marked effect upon the results.

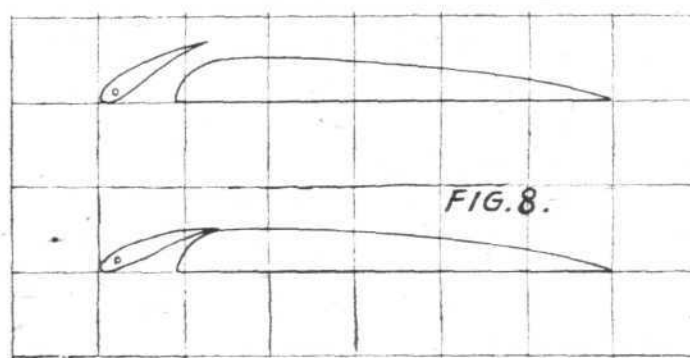
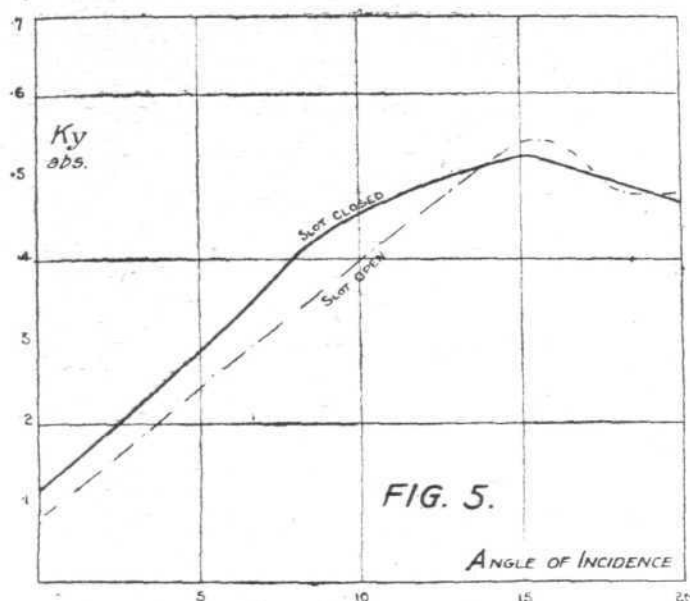
Fig. 6 shows some early type slots on an R.A.F. 6 section, and Fig. 7 the results obtained. The lift coefficient increases about 25 per cent. with the slot opened. Further developments are shown in Fig. 8, where a simple single slot is formed by the swivelling front edge on aerofoil No. 32, which was approximately of R.A.F. 6 cross section. This aerofoil was tested at the National Physical Laboratory at a speed

of 80 feet per second, and the results are shown in Figs. 9 and 10. The maximum lift coefficient of the plane with the slot closed was .633 and with the slot open .943, an increase of 50 per cent. The maximum value of the lift/drag coefficient was 16.6 and 14.1 respectively.

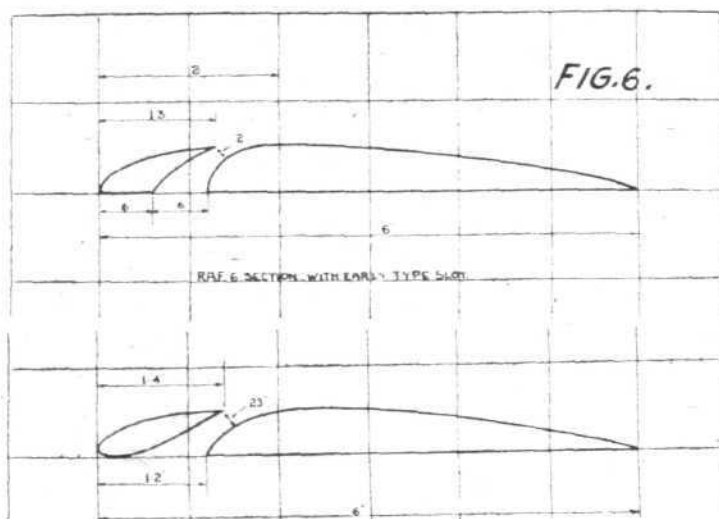
These results have also been plotted in Fig. 10, on curves showing the relation between speed and horse-power per lb. weight, according to the method described in a Paper which I read before the Aeronautical Society in February, 1917. (Published in *FLIGHT*, February 15, 1917.—Ed.) Speed is

plotted as $\frac{1}{\sqrt{K_y}}$, and horse-power per lb. weight as $K_x/K_y^{3/2}$.

With the slot open there is a reduction in landing speed of about 20 per cent., and with the slot closed practically all the advantages of the ordinary section.



Slotted aerofoil No. 32. Slot open and slot closed



Top diagram shows R.A.F. 6 section with early type slot. Lower diagram shows same section with later type slot

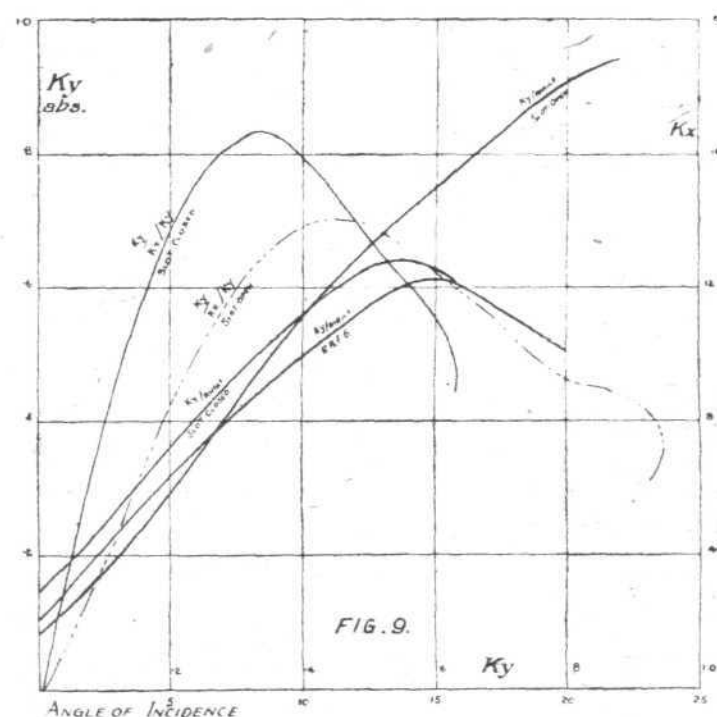


FIG. 9.

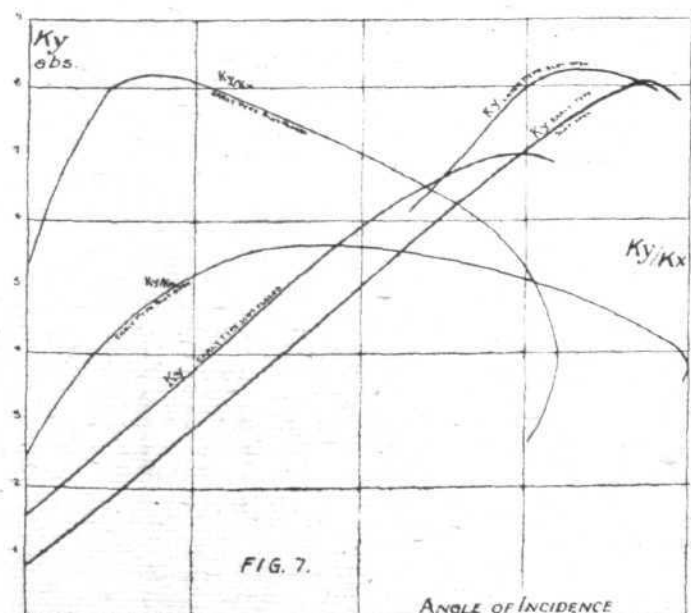


FIG. 7.

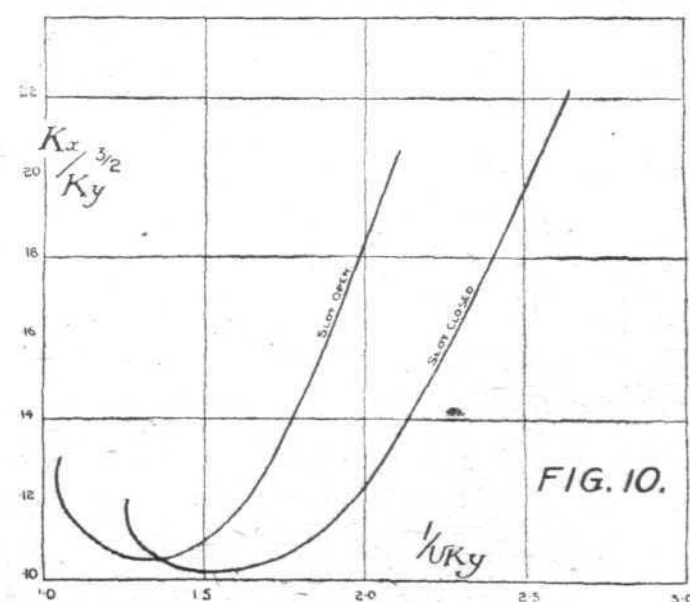
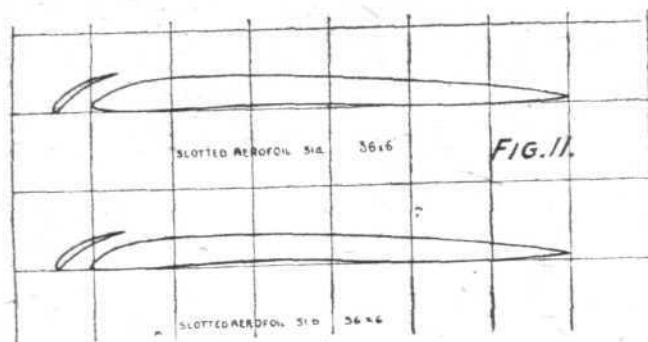
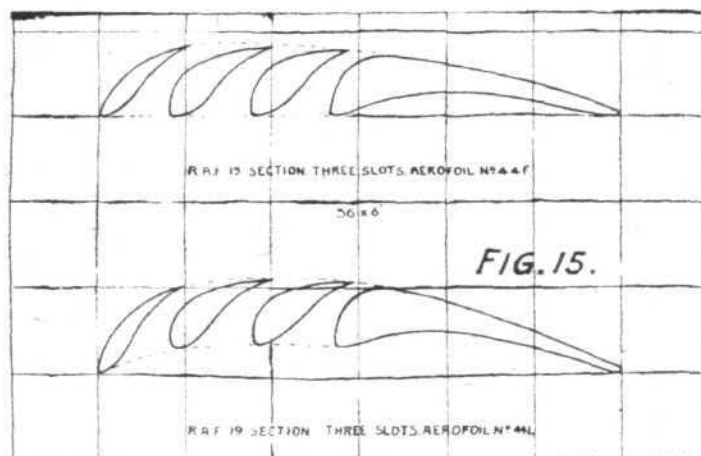
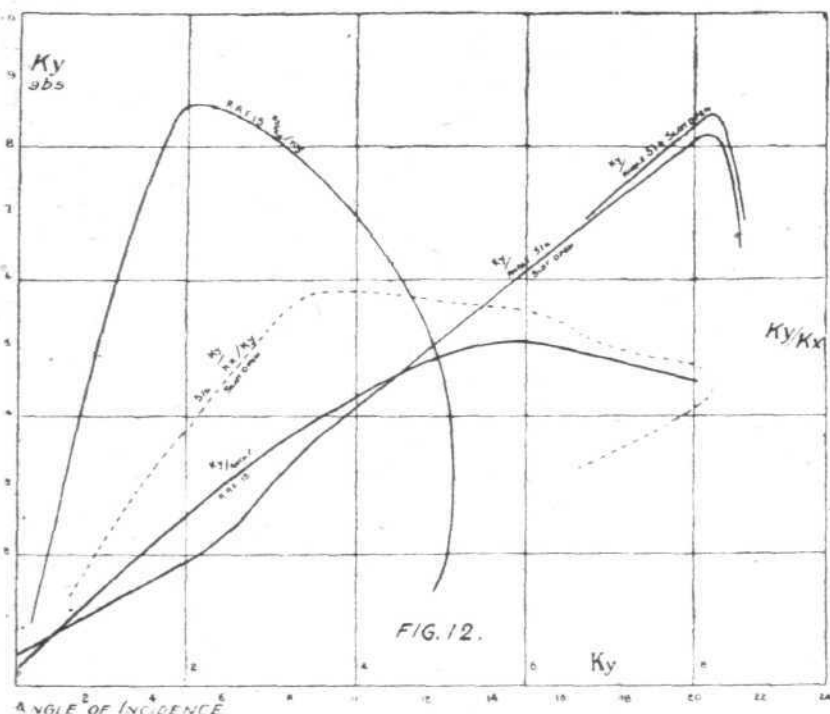


FIG. 10.

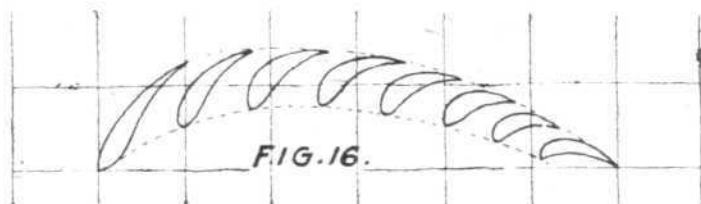


Above: Slotted aerofoil 51A, 36 in. by 6 in. Below: Slotted aerofoil 51B, 36 in. by 6 in.

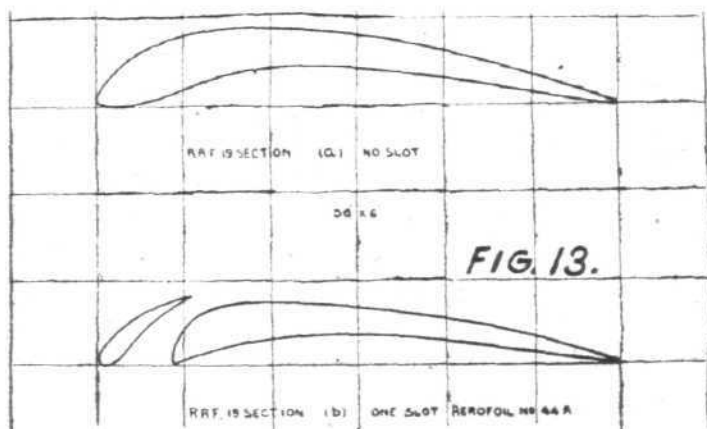
So far the tests described have been on one particular kind of section, and further experimental work has been carried out showing that similar results may be obtained with any type of section, both on what may be termed a "high speed" section, such as R.A.F./15, or a "high lift" section, such as R.A.F./19. Fig. 11 shows the R.A.F./15 section—51A and 51B—the section with the slot closed and the underside gap filled up being with an R.A.F./15. There is a slight difference between the two, 51A having the leading edge of the aft main aerofoil with a slight Phillips entry, whereas 51B has the leading edge of the aft aerofoil on the chord line. The results are plotted in Fig. 12, showing a slight improvement in lift in favour of 51B. A comparison between the R.A.F./15 and this section with the slots open is also given on the curves. The maximum lift coefficient is increased from .52 to .84, an increase of 61 per cent.,



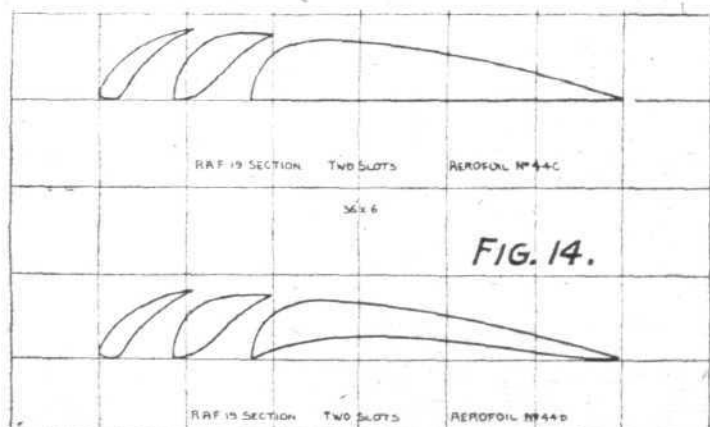
R.A.F. 19 section. Above: Three slots, aerofoil No. 44F; below, three slots, aerofoil No. 44L, both 36 in. by 6 in.



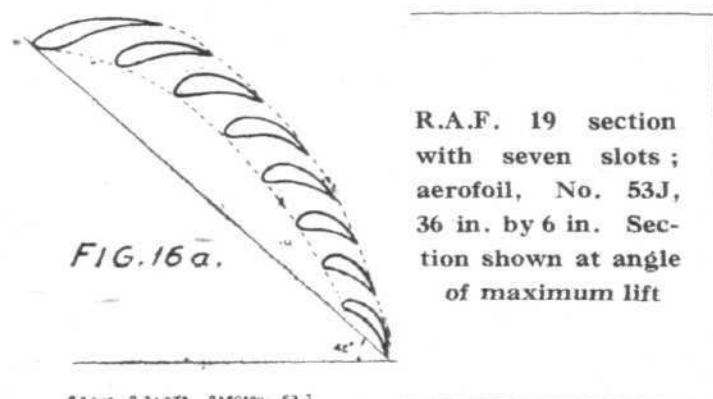
R.F.A. 19 section. Seven slots, aerofoil No. 53J, 36 in. by 6 in.



R.A.F. 19 section. Above (a) no slot; below (b) one slot, aerofoil No. 44A, 36 in. by 6 in.



R.A.F. 19 section. Above: Two slots, aerofoil No. 44C; below, two slots, aerofoil No. 44D, both 36 in. by 6 in.



R.A.F. 19 section with seven slots; aerofoil, No. 53J, 36 in. by 6 in. Section shown at angle of maximum lift

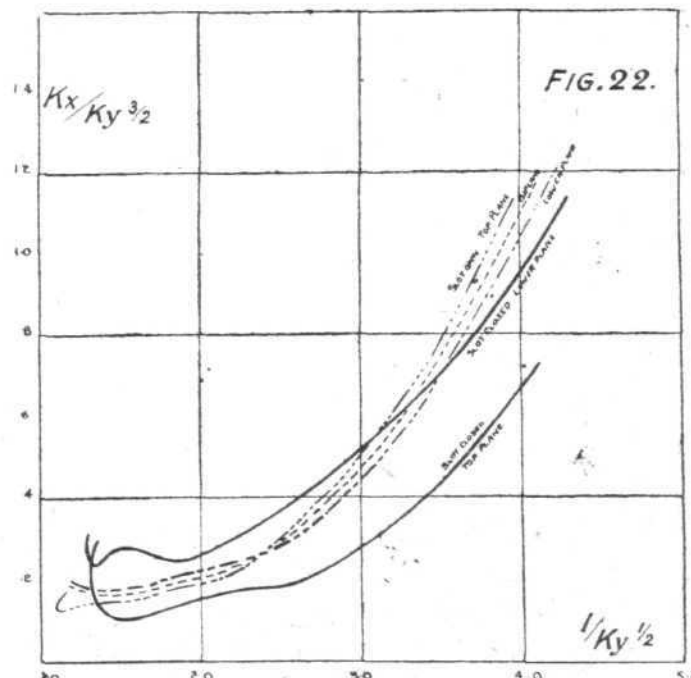
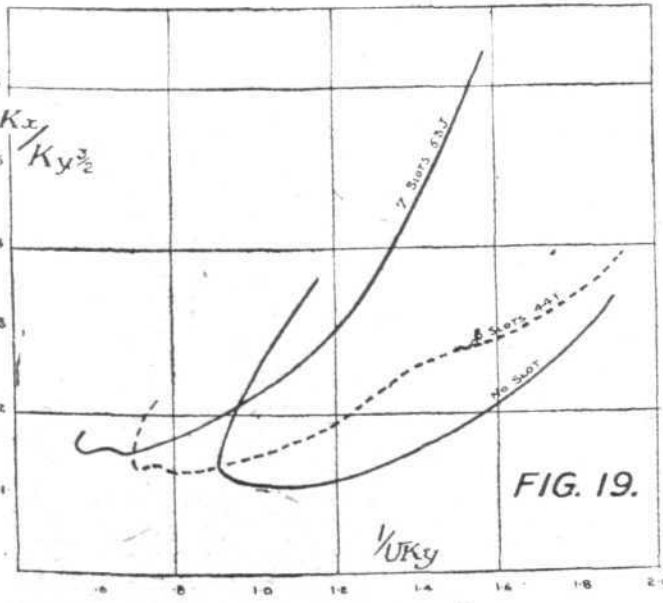
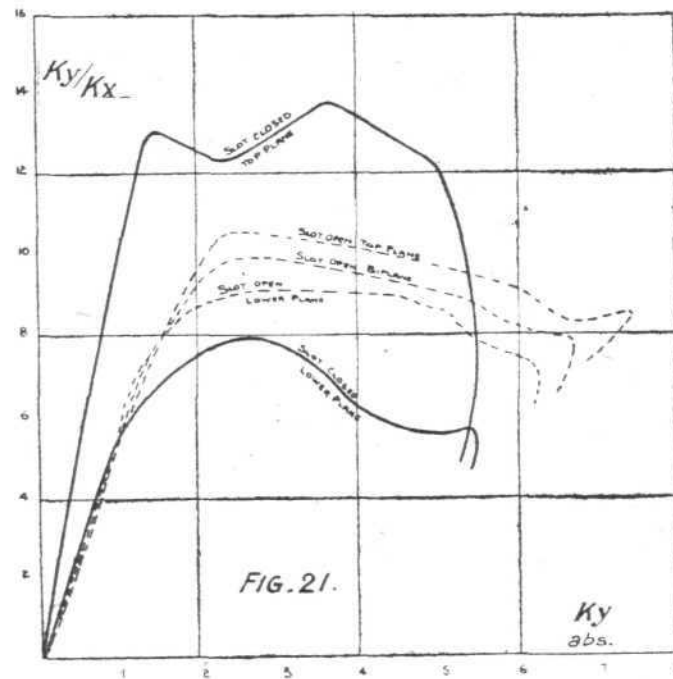
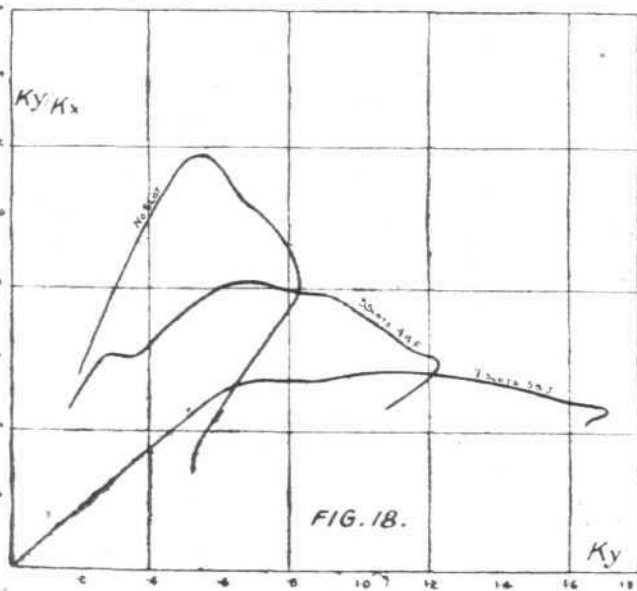
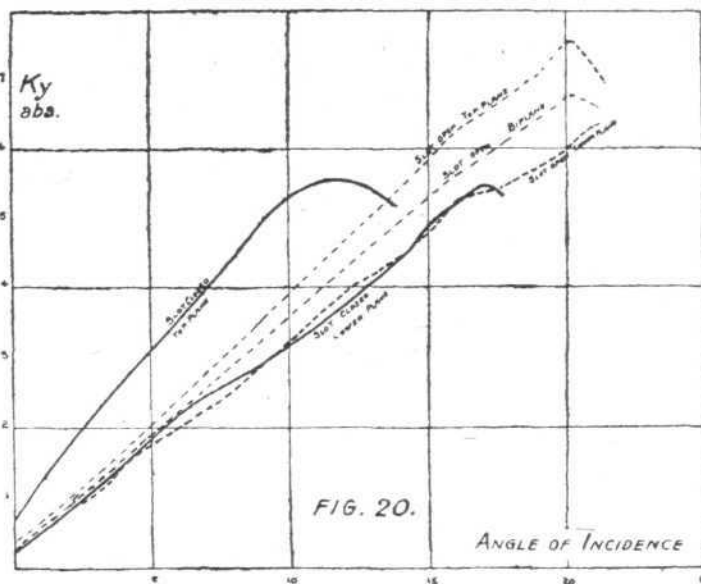
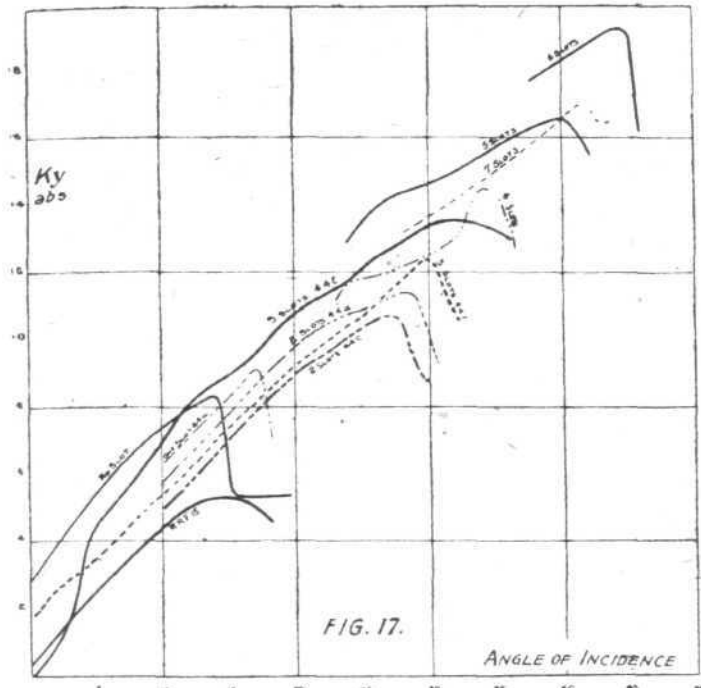
and the lift/drag ratio is higher with the slot open at all angles above 12° .

The same general type of results were obtained with a thick section, such as R.A.F./19, a section of which is shown in Fig. 13 with and without the slot, this aerofoil being No. 44. As, however, the R.A.F./19 is a section of small lift/drag ratio, the results of the single slot have not been included in this Paper.

An investigation of pressure distribution on the main and auxiliary aerofoils formed by the slot showed that the results obtained were of the same character as in an ordinary aerofoil, and that "burbling" would take place on the small auxiliary aerofoil when it was at its critical angle, just as an ordinary aerofoil would do without a slot. It is evident that this can be overcome by further slots extending throughout the plane, and a series of experiments were accordingly carried out with various sections, to determine the lift that would be obtained with a multiplicity of slots. In Figs. 14,

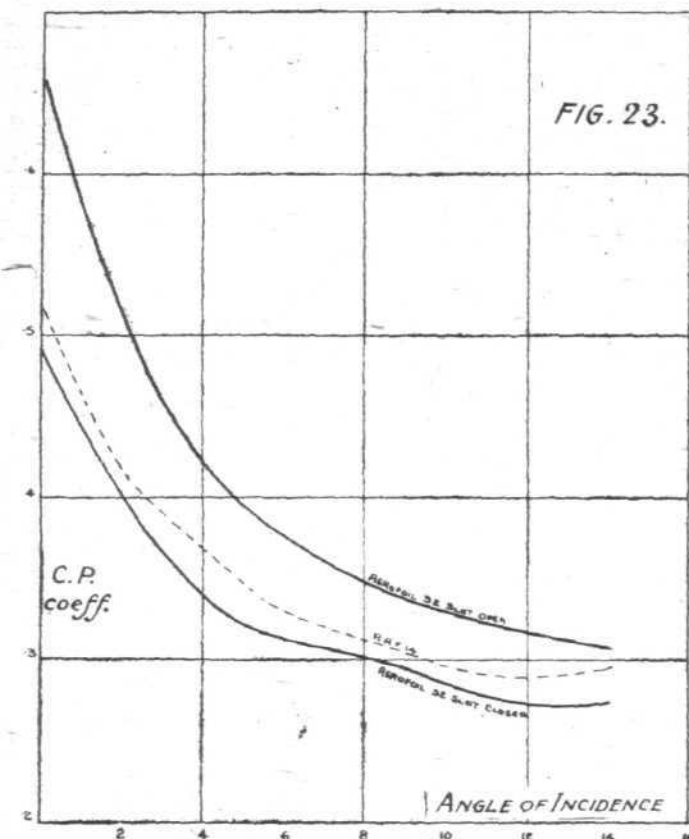
15 and 16 the R.A.F./19 is shown with two, three and seven slots, and a series of experiments were conducted with each number of slots from one to seven. The results are plotted in Figs. 17, 18 and 19. With six slots the lift coefficient reaches the abnormal value of 1.96 at an angle of 45° , and in comparison the curve of R.A.F./15, which is also plotted on Fig. 17, looks almost microscopic. At the angle of inclination of 45° at which this large value of lift coefficient is obtained, the tangent of the trailing edge of the aerofoil

is practically vertical, showing that the air is being deflected through the maximum angle possible and is leaving the plane practically in a vertical direction. Fig. 18 shows the lift/drag plotted against lift coefficient, and Fig. 19 the horsepower per lb. weight against speed.



These tests indicate that with a multiple-slot arrangement an increase in lift coefficient can be obtained of two to three times the normal value without the slot.

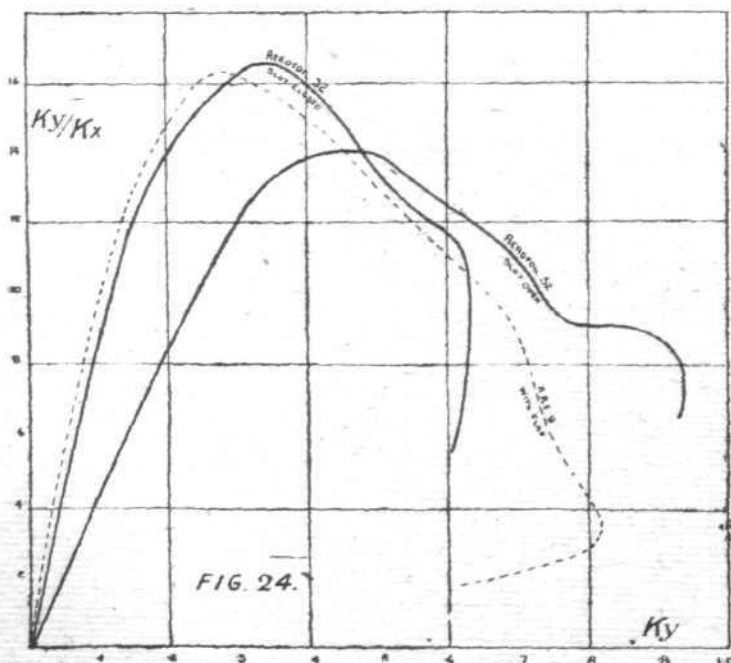
The tests so far described have all been monoplane tests, carried out in the wind tunnel at a speed of 40 ft. per second. A further series of tests was carried out on several sections—of which aerofoil 42 is an example—to determine whether the same effect could be obtained on a biplane. The results in Fig. 20 indicate that an increase in the lift coefficient of approximately 40 per cent. was obtained with a single slot, and that a normal result was obtained. Further tests



carried out since have clearly shown that with the necessary biplane corrections the slotted monoplane tests can be applied to biplane calculations.

Centre of Pressure Tests

Aerofoil No. 32, the lift/drag coefficients for which have already been plotted in Figs. 9 and 10, was tested for its centre of pressure movement, and the results are plotted in Fig. 23. At any given angle the centre of pressure with the slot open is slightly farther back, but taking into account the decrease in lift coefficient at small angles with the slot open, for any given value of the lift coefficient the difference is not great. The general result, however, of the centre of pressure line being slightly behind that of the normal



position is one that might be anticipated, as the pressure is more evenly distributed over the whole plane, and therefore the aft portion has a greater lift. This causes the result of the centre of pressure to lie farther back.

In commenting on the tests carried out on this section, the National Physical Laboratory reported as follows:—

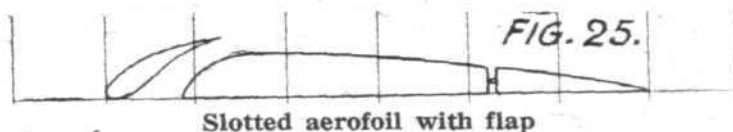
"The high lift obtainable with the flap open is very remarkable, especially in view of the fact that the position of the centre of pressure is little altered. At the critical angle the C.P. is at 0.295 chord with flap open, which corresponds with its position at about 8° incidence with flap closed. The longitudinal balance of the machine would be approximately the same when flying at 8° incidence or landing at 22° incidence, a very valuable characteristic. Scale effect in lift and drag are both considerable, but little effect on C.P. is found."

Flap Experiments with Slotted Aerofoil

An increase in the lift coefficient can be obtained by the use of a plane with flaps and altering the angle of incidence of these flaps. A series of tests were carried out at the National Physical Laboratory, published in the Report for the year 1913-14, pages 111 to 128. The results have been plotted in Fig. 24, compared with aerofoil No. 32 with the slot open and the slot closed. The R.A.F./19 curve shown is the envelope of the various curves, as plotted in Fig. 32 of the Report referred to above. The maximum lift coefficient on aerofoil No. 32 is approximately .943, as against .82 with the flap, which at this value was set back at an angle of 60°.

The increase in lift coefficient by the use of flaps can be obtained with the slotted plane as with the ordinary one.

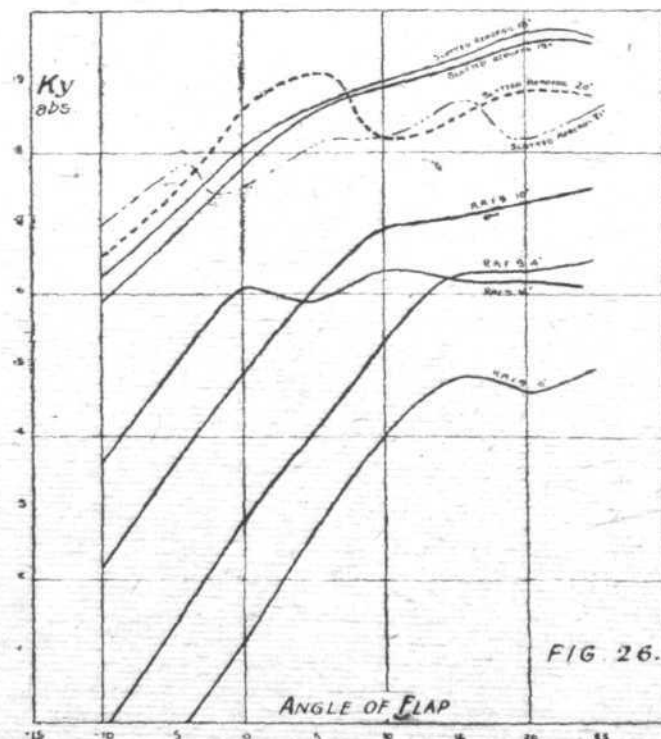
A series of tests were carried out on the section shown in Fig. 25, and the results are plotted in Fig. 26. With the plane inclined at 18° and 19°, a progressive increase in the lift coefficient is obtained, but at 20° and 21° the plane is inclined at the critical burbling angle, and owing to this



results are somewhat unstable. Further experiments have determined that the rolling moments obtained with the alteration of the flap angle are of the same order as those on the plane of ordinary cross section, indicating that full control can be obtained by ailerons in the ordinary manner when the slots are open.

Pressure Plotting

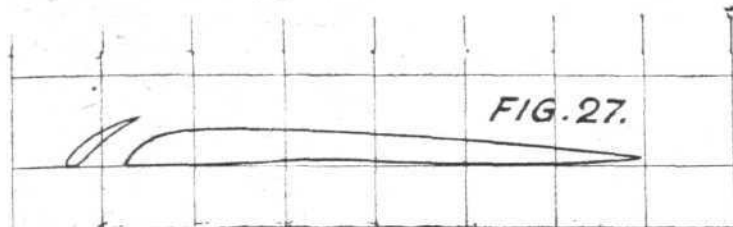
Reference has already been made to pressure distribution plotting on a slotted plane. These experiments were carried out on aerofoil No. 42, this being an R.A.F./15 section with an extra nose piece added—Fig. 27. The results are shown in Fig. 28. The shape of these curves is very similar to that of the ordinary pressure plotting, except for the break in the



curves where the slot is opened and the higher values in pressure obtained at the leading edge of the aft plane.

General Conclusions

The record which has been given is one of progress in experimental work with the slotted plane. In general, the results show that depending upon the slot shape, position, width, inclination, etc., an increase in lift coefficient of from 40 to 60 per cent. can be obtained with one slot, and up to 200 to 300 per cent. with a multiplicity of slots. The drag coefficient is slightly increased on the slotted plane with the slot closed, compared with an unslotted plane of similar cross section. The gap on the lower surface of the plane



Slotted aerofoil No. 42

makes but little difference to the drag, but any discontinuity on the upper surface is at once attended by a large increase in the drag coefficient. With flaps fitted to such an aerofoil the necessary increases in lift coefficient can be obtained, so that a proper *aileron* control is still available. This is a

abnormal pressure increase over the small area at the front edge of the auxiliary aerofoil is followed by a very rapid pressure drop, the pressure on the main aerofoil only reaching a value of 1.3. This very steep pressure graduation immediately results in "bubbling," the maximum value of the pressure at 20° having fallen to 1.75.

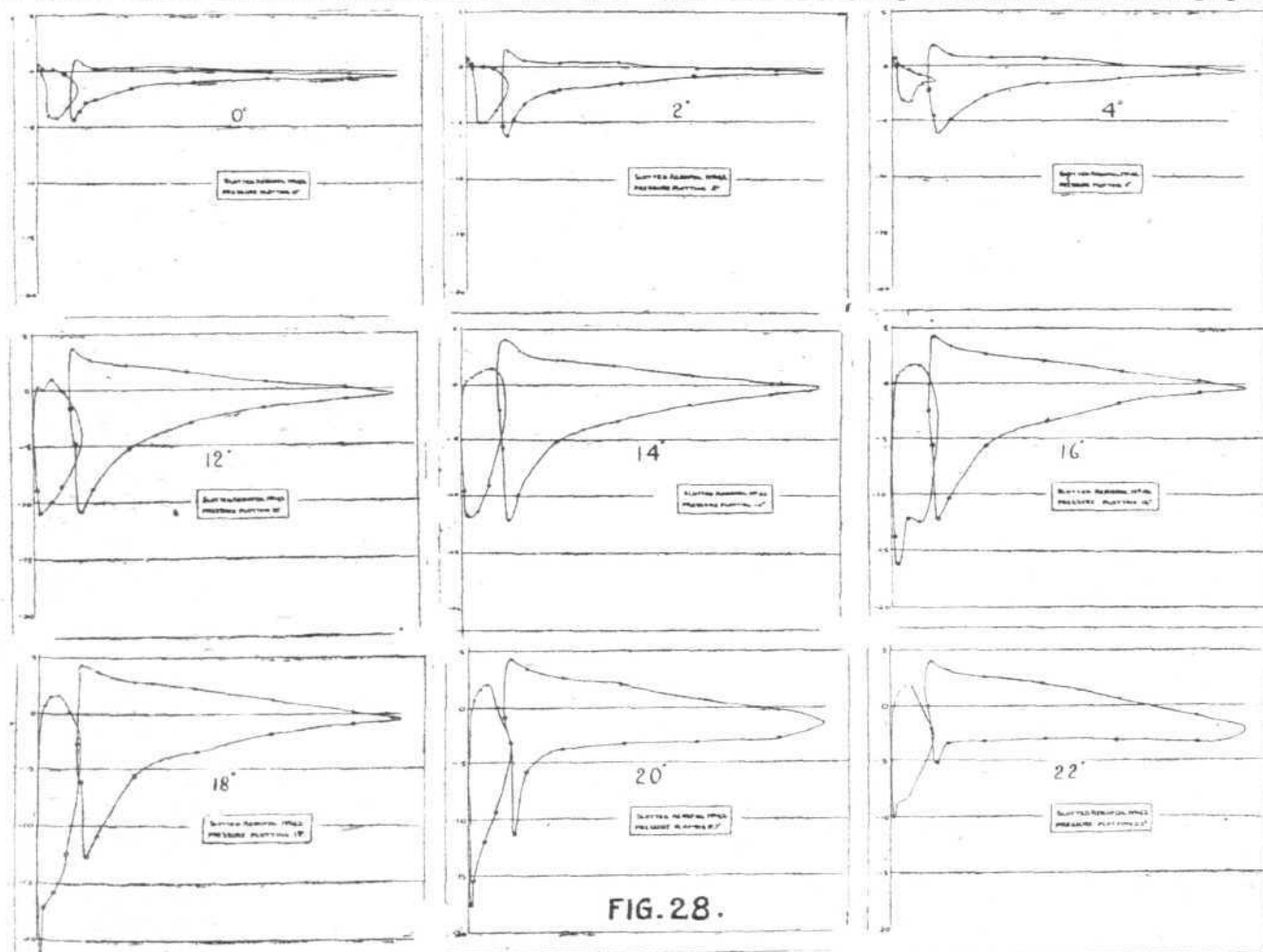
The same type of results are found with an ordinary plane, except that the rapid rise in pressure of the leading edge would have taken place at a smaller angle. To prevent "bubbling" it is therefore necessary to ensure that the angle of the auxiliary planes is always kept sufficiently small, so that a rapid increase in pressure is avoided.

With a multiplicity of slots this is possible, as has already been shown in the case of the R.A.F./19 tests. It would appear that the rapid rise in pressure is due to an abnormal velocity increase, with corresponding contraction of the live air stream, and that slightly farther back on the plane the necessary velocity reduction cannot be effected without setting up discontinuity and the eddying effect known as "bubbling."

Effect on Design

The increase in lift coefficient possible with the slotted aerofoil permits either of slower running speeds than at present, or, alternatively, of less power at top speed. The first is self-evident; the second requires some explanation.

In an aerofoil design with unslotted planes, the lift coefficient at top speed is usually less than that at which the best value of lift/drag is obtained. The landing speed and



distinct advantage over the method of increasing the lift coefficient by alteration of the flap angle, for with the flap at its maximum angle no *aileron* control is possible.

The centre of pressure is slightly aft of the position at smaller angles on a plane of similar section, but unslotted. This result is evident from an examination of the pressure plottings which show that distribution of pressure on each of the smaller constituent aerofoils, whilst similar to an ordinary aerofoil, result in the lift being more evenly distributed over the plane.

Causes of "Bubbling"

If reference is made once more to Fig. 28, it will be seen that as the angle of incidence is increased, the pressure at the leading edge increases very rapidly. At 14° the negative suction on the upper surfaces of the plane reaches a value of 1.2 for both auxiliary and main aerofoils. After this point is reached, the auxiliary aerofoil's pressure increases more rapidly, reaching 1.65 at 16° and 2.2 at 18° . At 18° the

maximum lift coefficient determine the value of the lift coefficient at full speed, the drag at this latter speed—excluding body resistance for the moment—the horse-power required to obtain this speed.

With the slotted plane the reverse procedure may be adopted. The lift coefficient top speed can be chosen with reference to the best lift/drag ratio of the plane, and the slow speed for alighting obtained by the provision of the necessary number of slots to give the required lift coefficient. At top speed it will therefore now be possible to work at lift coefficients between .2 and .3 instead of the lower values which call for the use of a section such as R.A.F./15 with low values of drag at very small angles. The trend of design would therefore be toward the choice of sections with high maximum lift/drag ratio rather than fairly high lift/drag ratios at low values of the lift coefficient.

If, then, machines can be designed with their planes at normal cruising speed, set at angles of incidence where the

lift/drag ratio is not less than 16 and perhaps as high as 21 or 22, a great economy will be effected in the horse-power that is required. Economy does not, however, rest with the planes alone, for if the planes are more efficient it will pay to sacrifice a little weight to diminish the body resistances of the aeroplane.

It would appear from our recent experiments that a total lift/drag ratio on a complete aeroplane can be obtained of not less than 1 to 15 at the top speed. With this value and a propeller efficiency of 70 per cent., a speed of 120 m.p.h. can be obtained with 33 lbs. per horse-power. It is evident that results such as these will emphasise the importance of improved methods of propulsion at slow speeds, so that the problem of arising with such heavy loads per horse-power is made easier than it would be at the present time.

The experimental results which have been given above have been confirmed by full-size tests on a D.H. 9, the front edge of which was altered so that its section included a slot in front of the front spar. The increase in lift coefficient measured from the decrease in stalling speed showed that the full-scale results followed closely the laboratory experiments.

Mechanical Devices Necessary

The operation of the auxiliary plane or planes to effect the transformation from slot closed to slot open does not present very great difficulties, nor does their addition to the structure lead to very much increase in weight. One of the simplest methods is by the simple swivelling of the front auxiliary portion, but in this device and in the actual methods of control, many solutions are possible, and only experience in manufacture and operation can indicate which is the best. It is to be hoped that the results which have been given above and the investigation which has been conducted will lead to further experiments being carried on elsewhere, so that improved results may be obtained to the benefit of aircraft and aviation generally.

The writer's thanks are due to Mr. R. O. Boswall, now lecturer on mechanical engineering at Manchester University, and who, until the beginning of last year, was in charge of our wind tunnel and carried through all the original experiments, as well as to his successor, Capt. G. T. R. Hill, and Miss Chandler and Messrs. Reynolds, Pirrie, Hall, Miles, Campbell and Fossett, assistants in our Research Department, for their able assistance.

The Discussion

After the lecture, the Chairman (Sir Joseph Petavel, K.B.E., F.R.S., F.R.Ae.S.) stated that he would like to ask one of the pioneers of flying to open the discussion, and called upon

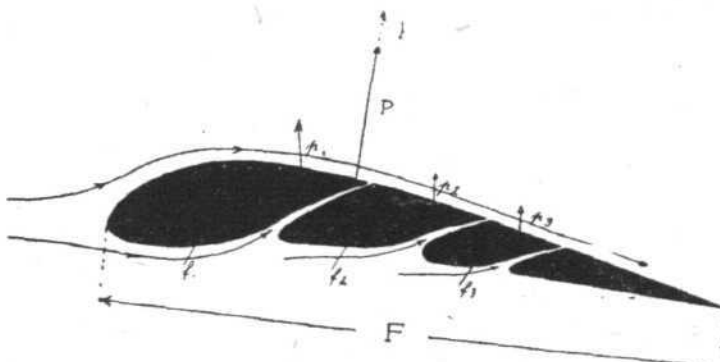
Col. ALEC OGILVIE, who congratulated Mr. Handley Page on his discovery and on the most interesting paper which he had just read. He said that he was very impressed by the figures which the lecturer had given, and that, accepting them, the possibility of carrying 33 lbs./h.p. at a speed of 120 m.p.h. was a very great improvement, as the present-day machine could only carry 12 to 15 lbs./h.p. at that speed. A rough estimate indicated that with the H.P. wing it would be possible to carry a paying load two to three times as great, which would help materially to make aviation a commercial proposition. Col. Ogilvie then pointed out what appeared to him to be the main advantage of the new wing: that it would lower the landing speed of machines. He said he thought that the present maximum speed of machines (about 125 m.p.h.) was adequate for the present requirements, but that the landing speed was, in the majority of cases, too high. If the new wing would reduce landing speed to a considerable extent, this would help greatly towards safety, and would also have the effect of lowering the insurance rates. The extra lift of the wings would leave more weight available, and consequently engines could be built more heavily and with greater reliability. Also it might be possible to fit a retractable undercarriage. He then referred to his own early Wright machine, which was loaded at the rate of 33 lbs./h.p., the same figure as that given by Mr. Handley Page. His engine, he said, weighed something like 11 lbs./h.p., so that if it were possible to fly and get off in the early days with such a load, it should be possible in these more enlightened times. With regard to the mechanical problems connected with the H.P. wing, he was not going to say anything except that he was somewhat doubtful on that point.

Professor L. BAIRSTOW said he would like to join in congratulations to Mr. Handley Page. The manner of presenting the paper, showing the various steps in the evolution of the wing, was extremely good, and gave a much better idea of the amount of work that had been done before the most favourable results were obtained. In the main, he agreed with the lecturer, and also with Col. Ogilvie on the point of the advantage of low landing speed. On the question of stability he would point out that the travel of the c.p. was not quite the same

problem in this wing as it is in the ordinary wing. For instance, suppose the machine to be flying with slot closed near its stalling speed, and with the tail trimmed for that attitude and speed. If the slot is then opened the first effect is to shift the c.p. back. But there is another consideration, that of downwash on the tail. Now the angle of downwash is approximately proportional to the lift coefficient, and therefore as the lift increased so would the angle of downwash on the tail. It might be, he said, that things would balance themselves out, but he was not sure that this would necessarily follow. Another thing connected with stability was the question of spinning. At the large angles of incidence corresponding to the high lift coefficients the rate of spinning would probably be great, and we were, he said, only just beginning to understand the nature of the spin. Before one could be quite certain on these points, further research would probably have to be made.

Capt. W. H. SAYERS called attention to a triplane built at Brooklands in the old days, in which the system of slots was incorporated. Unfortunately for the inventor, the small aerofoils were arranged the wrong way, and so the machine was not much of a success.

Major F. M. GREEN also congratulated the lecturer, and pointed out that it had become almost a generally accepted opinion that we were not likely to make much more progress with regard to wing sections. Mr. Handley Page had altered that opinion, and, really for the first time in the history of flying, a startling change had been made in wing design. He called attention to the question of scale effect, and stated that cases were on record of the scale effect having "gone the wrong way," that is to say instead of the lift increasing with scale it had decreased, while the drag had not become proportionately smaller, as is usually the case. He would particularly like to hear more about the results of full-scale tests, and hoped that the lecturer would give fuller particulars of these than he had done in the



THE GERMAN LACHMANN WING: A model of this was tested in the Handley Page wind tunnel, but gave a maximum lift coefficient of 0.5 (absolute) only.

paper. With regard to the figure of L/D for the complete machine of 15/1, this might be theoretically possible at one particular speed, but seemed rather high for maximum speed. He then pointed out that although the lecturer had said that there should be no particular difficulties in carrying out the construction of the wing, he (Major Green) was not quite so sure on that point. It was always a matter of difficulty to arrange for any sort of articulated wing, and he thought that very considerable difficulties were to be anticipated. He mentioned that the hinged trailing flap had not been found of any great use on military machines, since the lift was determined more by questions of ceiling and climb than by considerations of landing speed.

Mr. GNOSPELIUS said his experience had been that the question of L/D ratio was the bad feature of the high-lift wing, and that one must have the auxiliary portions of the wing movable.

Dr. A. J. S. PIPPARD was pleased with the way the lecture had been arranged, showing the successive stages in the development of the wing. He thought, however, that there was a gap in the lecture, as there seemed no logical explanation of the change from longitudinal to lateral slots. He rather thought this must have been a stroke of genius on the part of the lecturer. He would like to hear more of the reasons for this change. From a constructional point of view he thought there would be considerable difficulty in making the separate planes. Another point which he would like to see further elucidated was the arrangement of the planes in relation to the fuselage. The very high lift of the multiple slot section occurred at angles somewhere near 45 degrees, and it would be necessary to make provision for altering the angle between the planes and the fuselage. He agreed that the advantage of reduced landing speed would be very considerable.

Dr. A. P. THURSTON pointed out that we had been accus-

tomed to think that the aeroplane had nearly reached its limit of development, except for a new prime mover. To Mr. Handley Page was due the credit for having introduced a new means of support. He then referred to some experiments carried out by him at the East London College before the War, and asked permission to have shown a set of slides of pressure plottings obtained with a small rider plane which was so arranged that it could be placed in a number of different positions relative to the main plane. These diagrams were published in *FLIGHT* of November 20, 1914, and Dr. Thurston, in dealing with the results which they showed, came to the conclusion that "bubbling" was due to end effect, as a plane with aspect ratio of 9 had a very late bubbling point.

Col. Bristow said that when he heard the lecturer mention that for the full scale experiments a small plane was mounted in front of the ordinary wing section of the D.H.9 so as to avoid expense, he was absolutely horrified. To think, he said, that here were these experiments going on, experiments which might have the most far-reaching effects on the future of aviation, and yet the inventor had to consider a trifling matter of a few pounds saved. Surely the Air Ministry was not so far removed from Cricklewood that means of communication were not in existence, and he thought that money should be forthcoming from the Air Ministry to help in a matter like this.

In replying to the various gentlemen who had taken part in the discussion, Mr. HANDLEY PAGE said he would prefer to deal with them in the inverse order of speaking, so as to have them freshly in mind. With regard to Col. Bristow's remark relative to the question of expense, he would point out that the Director of Research was present, and would no doubt see that the opinions expressed by Col. Bristow would be conveyed to the right quarters. He then had shown the German slotted wing (Lachmann Flügel), and said that they had had a model of it tested in their wind tunnel. The best results they could get out of it, however, was a maximum lift coefficient of .5 (absolute) which was not very encouraging. With regard to Dr. Thurston's experiments he pointed out that these dealt with wings in tandem, which was not the same thing as the slot arrangement of the H.P. wing.

As regards the very nice remarks Dr. Pippard made about the change-over from longitudinal to transverse slots, Handley Page said, there was no question of genius about it. If it were found that the longitudinal slots did delay bubbling, it

was natural to say to oneself that with the longitudinal slots the air had to make up its mind which way to go to fill up the eddying region, and having made up its mind, it had to rush along head over heels. It was then quite a logical conclusion to say to oneself that it would be much easier for the air to be admitted along the entire span of the wing so that without fuss it could follow the curvature the whole way. That, as a matter of fact, was more or less the manner in which the transverse slots were arrived at. Concerning the matter of angle of fuselage to planes, it was quite obvious that he did not intend the fuselage to be down at an angle of more than 45 degrees when landing, as such a position would be distinctly uncomfortable for the unfortunate passengers, who would be landing on their backs, so to speak. As a matter of fact, the multi-slot arrangement had been referred to mainly for its academic interest, as showing what maximum lift might be obtainable. For the time being one got enough lift by one or two slots, and the multi-slot arrangement could always come along later, when one had had some experience with the simpler form.

With regard to Mr. Gnospelius' reference to the poor L/D ratio, he would point out that with the auxiliary plane lying snugly against the leading edge of the main plane, the L/D ratio was practically unaffected. Replying to Major Green the tests carried out were with a D.H.9, and as it was desired to keep the leading edge and front spar as little affected as possible, it was found that they could not get quite as nice a slot as was desired. In spite of this, however, the results compared reasonably well with model tests. Capt. Sayers had pointed out that even using the simple one-slot form, if one were satisfied with a speed of about 75 m.p.h. it would be possible to carry passengers for very much less than present rates. One had to make sure, however, that the aeroplane journey, to Paris for instance, would show a considerable saving in time over the ordinary steamer and rail journey. Professor Bairstow had referred to the effect of downwash angle. In the actual tests on a D.H. 9 it was found that the presence of the slot had the effect of making the machine nose heavy, not tail heavy.

The Chairman (Sir JOSEPH PETAVAL) then thanked Mr. Handley Page for his paper and for his witty and interesting reply to those who had taken part in the discussion, and the evening closed with passing a vote of thanks, proposed by Air-Commodore Brooke-Popham, to Sir Joseph Petavel for taking the chair.

ROYAL AERONAUTICAL SOCIETY NOTICES



Lectures.—Air-Commodore E. M. Maitland, C.M.G., D.S.O., A.F.C., will preside at the next meeting at 5 p.m., on March 3, at the Royal Society of Arts. Two papers will be read, on "Parachutes," by Major Orde-Lees, O.B.E., A.F.C., and on "Airship Fabrics," by Mr. J. W. W. Dyer.

The last meeting of the present Session will take place on March 17, when Capt. D. Nicolson, M.I.N.A., Associate Fellow, will read a paper on "Flying Boat Construction."

Early History.—The Secretary is glad to be able to announce that he has been able lately to obtain two copies of the first paper read before the Society on its formation, which he has placed in the Library. This was a paper read by Mr. Fred W. Breary, the original Honorary Secretary, at Stafford House, on February 28, 1866, when the Duke of Sutherland occupied the Chair. The occasion was the second Council Meeting (the first having been held at Argyll Lodge on January 12 of the same year), and the paper contains a suggested programme for the proceedings of the Society. The order for its printing and circulation to members has been found in the original minute book in the Society's possession. It is a paper-bound pamphlet of four octavo pages and is believed to be very rare. The Secretary had already a copy in his

own possession, but had not previously been able to trace one among the Society's records. He feels that Members will be glad to have this interesting historical addition to the Library. The first paper read before a meeting of the Members as a whole was, of course, F. H. Wenham's paper on "Aerial Locomotion," read at the Royal Society of Arts, on June 27, also in 1866, which has been reprinted as the first volume of the "Aeronautical Classics."

Election of Members.—The following Members were elected in the various grades as shown at a Council Meeting, held on February 15:—*Associate Fellows*: Flying Officer G. Mornington Bryer, A.F.C., J. D. Campbell, B. S. H. B. Wyn Evans, M.I.N.A., Shou-Heng-Huang, Flt. Lieut. A. J. Osborn, Lieut. C. St. Clair Penny, Sqdrn. Ldr. R. G. Parry, D.S.O., E. T. Robins. *Students*: A. M. Clifton, C. Daniel, E. M. Farris, W. H. Rossiter, V. S. Thompson, M. W. Wood. *Foreign Members*: R. A. Hendy, Lieut.-Col. H. St. Clair Smallwood, R.A.F.

Library.—The following books have been placed in the Society's Library:—"Applied Aerodynamics," Dr. L. Bairstow; "The Design of Screw Propellers for Aircraft," Dr. H. C. Watts.

W. LOCKWOOD MARSH,
Secretary

Los Angeles to New York in Two Days

Quick delivery in New York of a letter posted on January 24 in Los Angeles was made possible by the use of the airway part of the journey. It was delivered in New York at 5.30 p.m. on January 26, the letter having been carried by the night mail from Los Angeles to Salt Lake City, reaching there in time to be transferred to an aeroplane, which carried it to Omaha.

It was taken by train to Chicago, and by aeroplane from Chicago to New York.

Boy Mechanics for R.A.F.

AN open competitive examination, it is announced by the Civil Service Commissioners, for the entry of boy mechanics to the Royal Air Force will be held in London, Edinburgh, Dublin, Birmingham, Bristol, Chatham, Leeds, Manchester, Newcastle-on-Tyne, Norwich, Plymouth, and Portsmouth, on May 27. The limits of age are 15-16½ on July 1, 1921. Regulations and forms of application will be sent in response to requests by letter addressed to the Secretary, Civil Service Commission, Burlington Gardens, W. 1, on and after March 1.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

FLYING-BOAT CLUBS

[2039] Apart from Service requirements the demand for aircraft may be divided into two classes, *i.e.*, the industrial or transport, and sporting. The former at the moment is mainly dependent on the production of machines of which the all-in cost and operating expenses will permit of their employment as vehicles of transport in competition with other existing forms under given conditions. Although there are not lacking grounds for optimism in regard to the ultimate satisfaction of these basic conditions, there is, on the other hand, abundant reason for concluding that the growth of the ensuing demand must for some time be slow, and can go but little way toward supplying the degree of support requisite to the commercial continuance of the few firms surviving in the aviation industry.

Conditions of a nature which are vital in the instance of industrial aircraft have no place in regard to the air-vehicle destined to become the instrument of sport. Its analogy is found most nearly in the racing yacht, and in the event of a type of aircraft becoming available which would appeal to a class of sportsman analogous to the supporters of yacht clubs, and a satisfactory basis worked out for the creation of aircraft clubs, affording not only the wealthy private owner but the ordinary subscription-payer a sufficient opportunity of enjoying the sport, it is more than probable that a demand for machines of the type indicated would result which might enable more than one struggling firm to tide over the period during which some really satisfactory type of industrial aircraft may complete its laborious evolution.

Of existing types of aircraft the most promising in this connection is probably the flying-boat.

This type of flyer makes a distinct appeal to the nautical instincts so deeply-rooted in the Anglo-Saxon race, whilst, on the other hand, its employment involves no such heavy capital commitments in respect to landing-grounds and so forth as are inseparable from the employment of the purely land machines. Operating from river or harbour, it finds its place in centres where the devotees of allied and established sports foregather, and in this and various other respects it may claim advantages inherent in following lines of popular sympathy and usage.

Probably the greatest obstacle to the establishment of the flying-boat as a popular sporting favourite is its prime cost, coupled with the uncertain factors of depreciation and efficient life. Pending the production of a comparatively robust and cheap craft of this type, the formidable prime cost combined with expense of upkeep must necessarily militate against the multiplication of private owners of flying-boats. Even on current figures, however, the acquisition of two or three craft of existing types for the use of members would appear to be well within the limits of the capital resources of a moderate-sized club. It must of course be recognised that financial feasibility alone will not secure the success of any sporting club. Its organisation and regulation must necessarily be matters for handling by those experienced in similar undertakings. Initially and primarily it rests, however, to determine the capital commitment required

for the provision of the requisite minimum of shed accommodation, slips, etc., and the purchase of club-craft, together with a reasonable allowance for working expenses, including payment of the necessary staff for a limited period.

Upon the figure thus arrived at depend both the rate at which the subscription of members must be fixed, and the minimum number of supporters required to render the club a financially sound proposition. It is, of course, obvious that the attractiveness of membership must vary in direct ratio with the facilities for the enjoyment of the sport afforded—facilities which would necessarily be whittled down either by too heavy a capital burden or too numerous a membership. The vital nature of these considerations need not be emphasised.

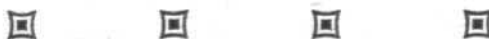
Assuming the establishment of a sufficiently reasonable figure as a capital basis to permit of a satisfactorily limited membership at a moderate rate of subscription, no special difficulty would probably be found in organising the club in convenient joint-stock company form. In particular instances some form of local personal guarantee might not be forthcoming to reinforce the security afforded to shareholders' capital by the subscription roll. The co-operation of private flying-boat owners might further serve to augment club revenues by way of charges for housing and upkeep of their craft, whilst otherwise adding materially to the success and attractiveness of the club.

That the successful foundation and working of one or two clubs of the character outlined would be followed by the establishment of many similar organisations may readily be prophesied, and with a judicious programme of club and inter-club events covering the flying season, it is not unduly optimistic to anticipate the growth of a steadily increasing degree of popular favour for the sport.

In any event the suggested development is one which would appear to present a *prima facie* case for consideration by flying-boat manufacturers, and not improbably the provision and publication of figures, backed up by such technical authority—which in themselves would constitute a convenient basic formula for the guidance of sporting pioneers innocent of the complexities of finance—might materially assist toward the creation of a new and robust variety of the "customer" so essential and so ardently looked for.

It is not suggested for one moment that the establishment of flying-boat clubs could be undertaken with propriety or success by aircraft manufacturers themselves. Such a method of proceeding would necessarily savour of commercialism to a degree which would probably suffice to neutralise any appeal to the instincts of the real sporting community. On the other hand, in view of the extremely indefinite ideas prevalent in regard to the capital basis and working cost involved in any given application of aviation to civil purposes, it is more than probable that failing some such initial educational effort on the part of manufacturers, the idea of the Flying-boat Club, however hazily attractive, will remain unrealised.

H. F. SMALMAN-SMITH



Aeroplanes for Forest Surveys

MR. E. CUBITT, Conservator of Forests, Federated Malay States and Straits Settlements, makes reference to the possible use of aeroplanes for survey purposes, in a report on the forests of British Malaya. The forest reserves of British Malaya cover nearly 3,000 square miles, and will probably be doubled in a few years; but up to the end of 1919 maps on a scale of 4 inches to a mile or over were available for only about a tenth of this area, and some of these contain insufficient detail.

The use of aeroplanes for forest survey purposes, writes Mr. Cubitt, now demands serious consideration. Forest officers who served in the Flying Corps during the War are convinced of its practicability, and in support of this view he mentions that an aeroplane party had sailed from New York to endeavour to ascertain the wood-pulp resources of Labrador.

It was planned to take aerial photographs of large forests, and from these to calculate the value of the pulpwood. Four aeroplanes were to be used in the undertaking, and by this method it was hoped to do in

about six weeks what would ordinarily require five or six years.

There would be considerable difficulty in Malaya in the provision of landing-places, but the narrowness of the Peninsula and its long coast-line suggest that seaplanes would be specially useful.

Grand Prix for Commercial 'Planes

As announced last week a start was made to put up a first try for this prize of the Aéro Club of France on the first 3-day period. MM. d'Or and Bernard got away from Bourget at 10.5 p.m. on February 20 in the Farman Goliath. Unfortunately the fog was so bad at Arras that they decided to give up further attempts for the moment and returned to Bourget at 2.35 a.m. on February 21. Even the huge guiding flares were not visible through the mist.

On Monday night (February 21) a second start was made at 10.16 p.m. The Goliath got going well, passing Lille at 11.50 p.m. and returned without incident to Bourget. After about forty minutes wait the second stage to Pau and back was started, but fog was again so strongly in evidence further attempt had to be abandoned near Angoulême.

AIRSHIPS

FROM THE FOUR WINDS

THE great photographic map of London, as seen on D.H. machines from the air, is a stage nearer realisation. It is an ambitious scheme, and requires great technical skill in the carrying out. When the result is seen, it should rank as a wonder of the world. Arrangements should be made for its exhibition when it should attract the public in thousands. As a first real effort to map a great city out by this method, it will be unique, although before many years are past it should be difficult to name any town of importance which has not received similar treatment.

It is quite fashionable now for notabilities of various grades to have aerial escorts by way of honour. Thus Admiral Sir Lewis Bayly upon arrival in the Toloa at New York last week, where he is being fêted as a guest of honour, was escorted down the bay to the dock by a squadron of five seaplanes and dirigible C.10. In another direction we find Georges Carpentier, who was a French pilot during the war, and who is giving boxing exhibitions in the Scandinavian capitals, having an escort of Danish aviators meeting him on the ferry bringing him from Sweden to Elsinore, and accompanying overhead his train to Copenhagen.

ADMIRAL VON TIRPITZ's expressed views in the *German Gazette* upon the parts to be played by airships and aeroplanes in the next war are that Zeppelins are unsuited craft for scouting owing to their size, vulnerability and dependence on the wind. He thinks, however, that there is a great future for the aeroplane. It did little at sea, he says, during the late War, and as at the outbreak it was in its infancy, and the problem of transporting it on sea had not been developed. He prefers to reserve his opinion as to its value in attack, while recognising that it has already become a serious factor.

In the Official Roll, containing the names of more than 40,000 officers of the British armies killed in the Great War, now available to the public, the total casualties in the R.A.F. (to March, 1918) are given as 2,506. This publication can be obtained through the usual channels for 7s. 6d.

TARDY recognition of "services rendered" has been made to M. Boiteux, a French gamekeeper, in connection with the Great Zeppelin raid over England in 1917, when so many of the Zepps. came to grief in France during their vain endeavours to return to the Vaterland. It will be remembered one of the dirigibles landed at Serqueux (Haute-Marne) for the purpose of rectifying some slight engine trouble, the commander thinking that in such a quiet country he would have no difficulty in taking the air again.

But the fact that it was a country district proved his undoing, for though for several miles around there was only one man, our friend the gamekeeper, he happened to be armed with a shot-gun. Resenting German Zeppelins coming down in his field he walked straight up to the commander of the great airship and demanded the surrender of the vessel and its crew, meanwhile covering the commander with his gun, and remained in possession of his capture until the arrival of the troops some time later.

Now at long last M. Boiteux's exploit has been officially recognised by being cited in last week's Army Orders.

MR. W. BARNARD FARADAY, LL.B., one-time Secretary of the Royal Aeronautical Society, has been adopted by the Central Council of the Combined Universities Conservative and Unionist Association as one of the prospective candidates for the Combined English University Constituency at the next General Election.

KEY INDUSTRIES protection is very far-reaching in its interest. Many are not alive to how closely the maintenance of our war-time established dye industry is concerned with matters aerial. Mr. Percy C. C. Isherwood, in advocating the protection of this industry in a letter, points out that the importance of synthetic drugs and photographic chemicals is obvious, both in times of war and peace, but it may not be clear at first sight how the position of, for example, the synthetic perfume industry is so essential to the security of the country. Few probably realised when enemy Zeppelins or

aeroplanes were overhead that the British synthetic perfume industry was an essential factor in the production of the aeroplanes which went up to attack them. In fact, it is not too much to say that at a critical period of the War our whole aeroplane programme depended upon the production of a chemical which up to that time had only been manufactured for perfumery purposes. Fortunately the plant and the experience in the manufacture of this chemical were there, but this example should serve as an object-lesson and a warning."

MR. MONTAGU S. NAPIER, whose portrait we reproduce on this page, is a man who has made history by his contributions to the development of the internal combustion engine. Mr. Napier was one of the pioneers of motoring; the first Napier car was designed by him and produced as far back as 1900, and the first successful six-cylindere car—the Napier—was also the result of his ingenuity. It is hardly surprising that a man of Mr. Napier's engineering capacity should have turned his mind in the direction of aeronautical engineering. Having regard to his health, Mr. Napier has to reside in the South of France, but, although so far from the works, he takes a keen interest in the business. The new Napier aero engine was designed out there under his supervision, Mr. Rowledge, the Napier chief designer, and some of the drawing office staff going out to him in connection with this important work.

AGAIN and again it has been alleged that hydrophobia has been re-started in this country through dogs being smuggled via the air. It may or may not be so, but there are possibilities of its being a true bill. Now the Committee of the Society for the Prevention of Hydrophobia, in their annual report, make the definite claim that this has been the medium of the trouble and affirm that "the air service affords ample opportunity for this deplorable practice. Fines," they say, "have no deterrent effect, and it is hoped that the Government will make the offence punishable by imprisonment."



Mr. Montagu S. Napier, Chairman of Napiers, Ltd., the makers of the 1,000 h.p. "Cub" aero engine which developed 1,057 on its bench test.

With which resolution we are thoroughly in accord once proved, whether the offence be committed by an air pilot or through any other source whatsoever. We even go so far as to suggest that the utterly selfish crime should be made punishable by hard labour without the option, that is, magistrates should not have the option of inflicting a fine. And the penalty should refer to all concerned in bringing into this country any dog except under proper licence.

A CURIOUS little cabined craft was seen on the Thames the other day when a "De Lambert" hydro-glider, upon the same principle as the Henry Farman glider mentioned recently, did a sprint from Westminster to Putney and back, with Sir Frederick and Lady Sykes on board. She has accommodation for six people, and has a 200 h.p. engine. There is no reason why these easy travelling water-craft should not become popular. They might well form a useful outlet for some of the air-screws of which there is such a plethora at odd London shops just now.

LADY RHONDDA, who these days must be reckoned amongst the busiest of women, and a woman friend on Monday travelled in a Handley Page, piloted by Lieut. R. H. McIntosh, from Paris to Croydon terminus. All told, a three hours' job.

FROM the *Evening Standard*:

"CIVIL AVIATION AS AN AIR RESERVE"

"There is one point about the languishing condition of civil aviation in this country that seems to have been over-

looked—I mean its relation to the strength of the Royal Air Force. Unless there is a thriving aircraft industry and a considerable reserve of experienced civilian pilots, the establishment of the R.A.F. must be largely increased.

"There has been too great a tendency to treat civil aviation as if it were of no importance in comparison with military and naval aviation, yet upon its development really depends the nation's future air power."

Great Scot! The Londoner, usually so wideawake, might well sign himself Rip Van Winkle this time. If there is one thing that most folk, who understand anything about it, have been rubbing in it is the "overlooked" point referred to above. In FLIGHT the ways and means for founding a great Service air-arm through commercial aviation was pressed hard even long before the Armistice came. One day our ostrich Government will probably realise what is going on in surrounding lands, and the public will then be left wondering why it costs such a heap of their cash to overtake the lead attained by far-seeing brotherly (and otherwise) nations.

A STROKE of luck is reported from Dublin, in favour of a Galway labourer named Michael O'Toole, who is employed at the Arranmore aerodrome at a wage of £2 a week. O'Toole has received information from America that he is sole heir to his brother's fortune. Some idea of the amount may be gathered from the fact that on one ranch the stock is valued at £20,000. O'Toole's brother died seven years ago, and since then search has been made for his next-of-kin, it being only recently that Michael was traced. He should feel very light and airy over this windfall.

THE ROYAL AIR FORCE

London Gazette, February 15

Permanent Commissions

Gazette, Aug. 1, 1919, appointing Maj. M. G. Lee to a permanent commn. is cancelled.

Stores Branch

The following are granted permanent commns. as Flying Offrs., retaining their present seny.—P. F. Connaughton, W. A. Glasper; June 17, 1920.

Flying Offr. H. F. Webb is granted a permanent commn., retaining his present substantive rank and seny., with effect from Sept. 12, 1919, and is transfd. to the Stores Branch, with effect from June 17, 1920. *Gazette*, Sept. 12, 1919, appointing him to a short service commn. is cancelled.

Pilot Offr. H. B. S. Ballantyne is granted a permanent commn. as a Flying Offr., with effect from and with seny. of Sept. 16, 1919, and is transfd. to the Stores Branch with effect from June 17, 1920. *Gazette*, Sept. 16, 1919, appointing him to a short service commn. is cancelled.

Short Service Commissions

The following are granted short service commns. in the ranks stated, with effect from the dates indicated, retaining their original seny. in the substantive rank last held prior to the grant of this commn., except where otherwise stated:—

Flying Officer from Flight Lieut.—S. E. Adams; Jan. 31.

Flying Officers.—B. M. T. S. Leete; Jan. 28. J. W. Sole; Jan. 29.

Flying Officer from Pilot Officer.—With effect from and with seny. of Feb. 2.—C. R. Stewart.

Flying Officer L. W. Mawbey relinquishes his short service commn. on account of ill-health contracted in the service, and is permitted to retain the rank of Lieut.; Jan. 8.

Flight Lieut. G. R. Hill resigns his short service commn., and is permitted to retain the rank of Capt.; Feb. 17.

Flying Officer J. H. Cooper resigns his short service commn., and is permitted to retain the rank of Lieut.; Feb. 1.

Flying Officer Adams will be placed at the head of the list of Flying and Observer Officers, and will retain seny. relative to officers who have been similarly gazetted to short service commns. in a rank lower than their previous substantive rank, in accordance with his previous position on the gradation list.

Flying Branch

Lieut. (actg. Capt., Hon. Maj.) L. G. S. Reynolds, O.B.E., relinquishes his temp. commn. on appointment to T.F. Reserve, and is permitted to retain the rank of Maj. Lieut. (Hon. Capt.) P. J. Slater, D.F.C., relinquishes his temp. commn. on appointment to T.F., and is permitted to retain the rank of Capt. Sec. Lieut. F. H. Cowley relinquishes his temp. commn. on appointment to T.F., and is permitted to retain his rank. Pilot Officer (Hon. Flying Officer) F. C. de L. Kirk relinquishes his temp. commn. on return to Army duty; Oct. 26, 1920 (substituted for *Gazette*, Jan. 21). Flight Lieut. B. U. S. Cripps, M.C. (Capt., Welch R.), relinquishes his temp. commn. on return to Army duty; Jan. 31. Observer Offr. A. Cox (Lieut., R. Welch Fus.), relinquishes his temp. commn. on retirement from the Army, and is permitted to retain the rank of Lieut.; Feb. 17. Sec. Lieut. T. A. Spradbury relinquishes his temp. commn. on ceasing to be employed; Feb. 7, 1919 (substituted for *Gazette*, June 10, 1919). Lieut. G. H. S. Cregeen (Unemployed List) resigns his temporary commn.; Feb. 16.

A Dornier for Switzerland

It is reported that the Swiss Ad Astra Company has just taken delivery of a new Dornier flying boat to carry six. This machine, which is probably of the type Do. Gs. II, described in FLIGHT recently, has two 260 h.p. Maybach

Transferred to the Unemployed List.—Lieut. J. W. Thomson; Sept. 20, 1919. Lieut. H. G. Garrett; Oct. 10, 1919. Lieut. S. J. Stewart; Feb. 20, 1920 (substituted for *Gazette*, March 2, 1920).

Gazette, Jan. 7, relating to Sec. Lieut. A. Buckley, is cancelled.

Administrative Branch

Lieut. R. Wight relinquishes his temporary commn. on appointment to T.F. Reserve, and is granted the rank of Capt. Sec. Lieut. A. Buckley is transfd. to the Unemployed List; Feb. 14, 1919.

Technical Branch

Transferred to the Unemployed List.—Lieut. J. H. Payne; April 17, 1919. Lieut. R. H. Rivers; Oct. 13, 1919.

Memoranda

Nine Cadets are granted hon. commns. as Sec. Lieuts., with effect from the date of their demobilisation.

London Gazette, February 18

Permanent Commissions

The name of Sqdn. Ldr. Robert Hilton Jones, O.B.E., is as now described, and not as *Gazette*, Aug. 22, 1919. Flt. Lieut. W. R. MacKenzie, D.F.C., is placed on half-pay, Scale B, from Feb. 9 to March 9. Flying Offr. E. E. Turner, D.F.C., is placed on half-pay, Scale B, from Feb. 5 to 11.

Promotions

The name of Flying Offr. Herbert Bainbridge Russell is as now described, and not as *Gazette*, Dec. 31, 1920.

Flying Branch

Lieut. T. A. Ford relinquishes his temp. commn. on appt. to T.F., and is permitted to retain his rank. Lieut. H. H. Storey relinquishes his temp. commn. on appt. to T.F. Reserve, and is permitted to retain his rank.

Transferred to the Unemployed List.—Lieut. T. H. Noble; Jan. 20, 1919. Lieut. E. F. Murphy; Feb. 11, 1919. Sec. Lieut. (Hon. Lieut.) A. Turnbull; Feb. 11, 1919. Lieut. H. V. Alder; Sept. 20, 1919.

Administrative Branch

Lieut. E. W. Bassil relinquishes his temp. commn. on appt. to T.F. Reserve, and is permitted to retain his rank. Lieut. W. A. J. Mitchell (Capt., R.G.A., T.F. Reserve) relinquishes his temp. commn. on return to Army duty; Sept. 12, 1918. Lieut. S. Sprenger is transfd. to the Unemployed List; Sept. 24, 1919.

Technical Branch

Sec. Lieut. H. H. Miller to be Lieut., without pay and alices.; May 20, 1919 (since demobilised). The name of Sec. Lieut. C. H. Bunn is as now described, and not "Bonn," as *Gazette*, Dec. 21, 1920.

Memoranda

Lieut.-Col. (actg. Brig.-Gen.) G. Livingston, C.M.G., relinquishes his temp. commn. on appt. to T.F. Reserve. *Gazette*, April 8, 1919, stands. Maj. (actg. Col.) C. A. J. Butter, O.B.E., relinquishes his temp. commn. on appt. to T.F., and is permitted to retain rank of Col.

The following Lieuts. relinquish their temp. commns. on appt. to T.F. and are granted rank of Capt.—D. N. Thompson, M.C., J. T. Kyffen.

Lieut. (actg. Capt.) A. R. Owens, M.B.E., is transfd. from S.O. to the Unemployed List; April 4, 1919.

One Cadet is granted an hon. commn. as Sec. Lieut.; Oct. 28, 1918.

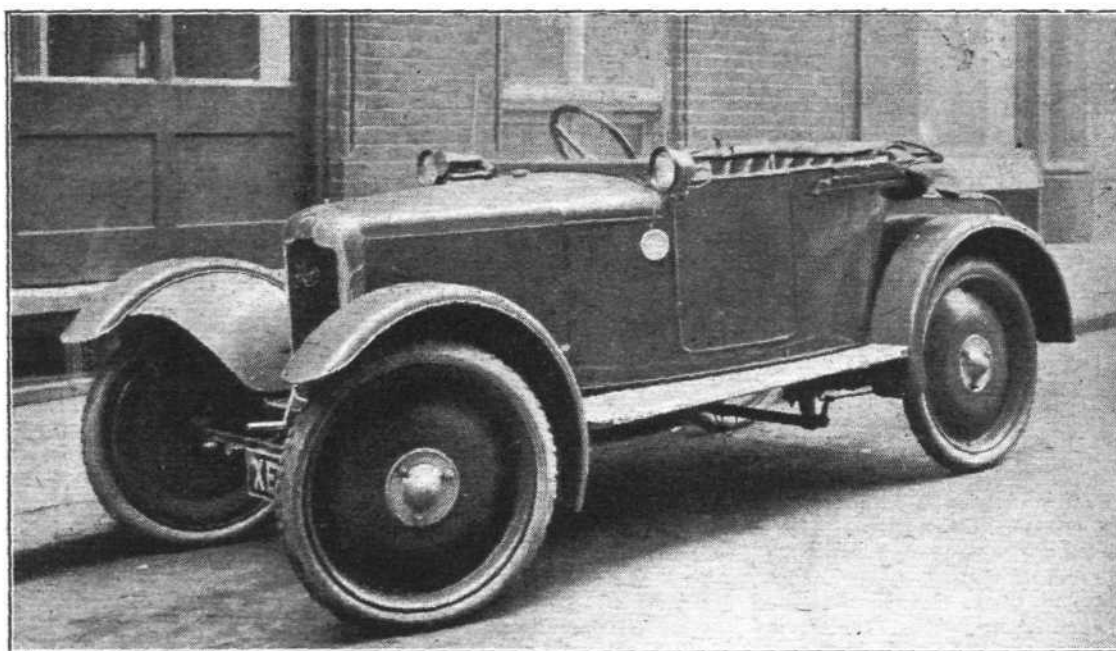
engines, and is built of aluminium alloy throughout. Several more machines of the same type are reported to have been ordered, and will be run on the Lindau-Geneva route, linking up with the German lines to Sweden, Prague, etc., and also, it is said, with the France-Spain routes.

A NEW K.L.G. PLUG AND A ROVER CAR FOR A GUESS

At this period of time it is unnecessary to recall how Mr. Kenelm Lee Guinness was called back from fighting the enemy on the high seas to make plugs to deal with the said enemy more effectively in the air. It is sufficient to say that the success of K.L.G. plugs continues mainly as a result of the fact that the makers, the Robinhood Engineering Works, Ltd., have never been content to rest on their laurels, but are continually at work to improve their product. It is well known, although the fact is often overlooked, that a plug which has been designed for use with one type of engine will not function properly in another mainly because of the variation in the internal conditions. This coupled with the

any danger of "seizing," while the centre electrode is wrapped with ruby mica, placed in position under great pressure and then highly polished. The plug is made in five types to suit practically all models of British, Continental and American cars, and the price is 6s. each, while the centres are sold at 3s. each.

With regard to the competition it may be said that the first prize—a 1921 model 8 h.p. Rover car, value £300, will be awarded to the purchaser of a K.L.G. plug who correctly estimates or most nearly estimates, the number of K.L.G. plugs sold under the special scheme by Messrs. S. Smith and Sons during the periods February 21 to March 7, inclusive.



The K.L.G. plug.

The 8 h.p. Rover car which forms the first prize in the K.L.G. competition.

research work which is always going on in the K.L.G. laboratory accounts for the advent of the new "G" detachable K.L.G. plug for car work, to introduce which Messrs. S. Smith and Sons (M.A.), Ltd., the selling agents, of 179-185, Great Portland Street, W. 1, have organised a competition, some details of which are given below.

One of the main features of the new "G" plug is the detachable centre. The idea is that the body of the plug remains in its place in the cylinder and when the plug requires attention or replacement the centre, by removing the gland-nut, may be taken out and cleaned, or, if necessary, replaced by a new centre. The centres are being placed on the market separately with this object.

The body of the plug and the gland-nut are treated by a special method claimed to render them rustproof and obviating

The second prize, for the next nearest estimate, will be a 4 h.p. Triumph roadster, value £127 10s. and the third, a 2½ h.p. Enfield two-stroke, value £65. There will also be six prizes in the shape of Smith bezel-wind mantel-piece clocks, in mahogany or oak, value £6 10s. each, and fifty consolation prizes of motor accessories value one guinea each. The plugs may be purchased from a local dealer, or, if he has no stock, direct from S. Smith and Sons, and an estimate must be written on the form which will be found in the box; when it has been completed it must be sent to 179-185, Great Portland Street, W. 1. In the event of a tie the first estimate opened will count for the prize, and no person may take more than one prize.

There are also a number of prizes for dealers in addition to the above.

First All-Japanese Air Race

RECENTLY the first all-Japanese air race was flown over a course of 400 miles. Seven machines were entered, and the winner of the race was Ishibashi on a Spad, with Hispano-Suiza engine. His time over the course was 3 hours 27 mins. Presumably this Spad was built under licence, as the race was for Japanese-built machines.

Progress in Peru

A NATIONAL aeronautical company was founded for commercial aviation in Peru as far back as July last year by Lieut. Lloyd Moore, one of the crew of the "N.C.3," Mr. A. E. Russell, and Capt. M. A. Mott, an experienced American war pilot. This organisation appears to have done well up to the present, and possesses nine planes at its aerodrome at Bellavista, with an additional machine due to arrive shortly. A number of pupils have already been enrolled and drafted off with their licences as C.N.A. pilots, one of these pupils, Mr. Herbert Tweddle, recently completing the flight of about 700 miles from Lima along the Peruvian coast to Puerto Pizzaro, the most northerly port of the Republic. The company hope that they will be able to receive recognition by the F.A.I. for pilots' certificates to be issued by the C.N.A. for those who are trained under their aegis.

The bulk of the C.N.A. flying traffic up to the present has been south of Lima to the comparatively thickly populated agricultural areas of the Province of Ica. Flights to the various haciendas and towns in this section are effected in from one to two hours. Overland by motor-car or horseback the same trip would require a strenuous two or three days. The steamer trip, when a ship is available, requires from one to two days. The machines have been used for the transport of passengers, mail, money, newspapers, spares for machinery, etc. The carriage of newspapers was done as an experiment, and reveals the enormous field open for mail-carrying aeroplanes along the Peruvian coast.

Charting the Rockies Air

At Blossburg, on the summit of the Continental Divide, a branch of the Helena, Mont., office of U.S. Weather Bureau is to be established, for observations of air currents and other details which will be used in charting a safe route for aeroplanes above and across the Rockies.

The Dutch Indies Acquiring Aircraft

A NUMBER of D. VII machines from the Fokker factory, fitted with British engines, for use in the Dutch Indies, have been ordered by the Dutch Colonial Department. They have been specially constructed for use in the damp warm climate of that part of the world.

SIDE-WINDS

THE 1921 *Almanach Sportif Bessonneau* is just to hand. It contains nearly 200 pages of practical and useful information (with illustrations) dealing with the World of Sport. There are complete lists of records put up in the various branches of sport—aeronautics, motoring, boxing, football, golf, cycling, etc.—as well as a programme of the principal sporting events for 1921. It is, in fact, a veritable *vade mecum* of sport, for all classes of sportsmen—and sportswomen!

MR. D. LAWRENCE SANTONI, founder of the "Società Idrovolanti Alta Italia," which during the War did such splendid work for the Allies' cause with the Savoia flying boats (winners of the Schneider Cup both in 1919 and 1920), is definitely leaving Italy. Having ceased all relations with the Società Idrovolanti Alta Italia of Sesto-Calende, he has now established in Paris, at 72, rue la Boétie, an industrial office with an aeronautical department, with representatives in the chief capitals of Europe. Mr. D. Lawrence Santoni will be glad to negotiate with English constructors wishing to push their products abroad.

HERBERT TERRY AND SONS, of Redditch—and spring renown—inform us that they have a Stand at the "British Industries Fair," at Birmingham, where they will be pleased to welcome all inquiries relative to the remarkably varied assortment of goods they are handling. Their latest list is "chock" full of useful articles, and is well worth writing for.

ALTHOUGH Crossley Motors, Ltd., find it is impossible to offer their cars at prices lower than those given in the current price list, they have, in order to remove any uncertainty which may exist in the minds of possible purchasers, issued an announcement which makes it clear that if the prices of Crossley Cars are reduced before July 1, 1921, then all purchasers who have bought their cars at current list prices between January 1 and July 1, 1921, either direct from the company or from their authorised agents, will be entitled to the difference, by way of rebate, upon application to the company together with the necessary proof before July 1, 1921.

MESSRS. BARROW, BROWN AND CO., LTD., of Bangkok, Siam, advise us that Mr. E. O'Hara, a director of their company, left Bangkok on a brief visit to Europe, at the end of January, and may be communicated with at Messrs. The Allied National Corporation, Ltd., 34, Great Tower Street, London, E.C., from about March 5.

At the British Industries Fair, now open at the White City, Shepherd's Bush, Cellon (Richmond), Ltd., are exhibiting at their Stand the latest examples of the uses of their "Cerric" Products, including metal lacquers, wood solutions, bronzing mediums, wood finishes, enamels, etc. They will be pleased to welcome old and new friends there, and it may be noted that the nearest entrance to their stand is Uxbridge Road entrance.

AN exceptional opportunity for motorists to obtain accessories or fittings at advantageous prices is offered by the "clearance sale" now being conducted by Messrs. S. Smith and Sons (M.A.), Ltd. It is impossible to give any adequate idea of the list of things now to be obtained at 25 to 50 per cent. below their original prices, but the Special Clearance Sale Catalogue which has just been issued should certainly be sent for. The sale continues until March 7, but it would be as well not to delay too long before dropping a card to 173, Great Portland Street for that catalogue. The good things are sure to be snapped up early.

BARIMAR, LTD., the World's Scientific Master Welders, have opened yet another service dépôt at 117, Vicar Lane, Leeds. As in the cases of their dépôts at Manchester, Birmingham, Newcastle and Cardiff, all classes of welding work will be dealt with, and the Barimar metallurgical process, for repairing scored cylinders, and the salving of new castings which have been scrapped through blowholes or other blemishes, will be operated on the spot.

PUBLICATIONS RECEIVED

National Physical Laboratory: Collected Researches. Vol. XV, 1920. London: H.M. Stationery Office. Price 20s. net.
The Problem of Soaring Flight. By E. H. Hankin, M.A., Sc.D. Reprinted from the Proceedings of the Cambridge Philosophical Society, Vol. XX, Part 2. The University Press, Cambridge.

Report No. 104. Torsion of Wing Trusses at Diving Speeds. National Advisory Committee for Aeronautics, Navy Building Washington, D.C., U.S.A.

Annual Report of the Board of Regents of the Smithsonian Institution, for the year ending June 30, 1918. The Smithsonian Institution, Washington, D.C., U.S.A.

Technical Note No. 30. Design of Recording Wind Tunnel Balances. By F. H. Norton. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

LEGAL INTELLIGENCE

Leaflets from an Aeroplane

A CHARGE of contravening the Air Regulations by having, on November 2, from an aeroplane over various parts of Glasgow, dropped or caused to be dropped a number of leaflets bearing the words "Vote no change" was admitted by John Wilson Connell at Glasgow Sheriff Court on February 14.

It was stated for the defence that the incident occurred on the day of the Local Veto polling in the city.

The respondent should have appeared in Court when Capt. Reeve was brought up the previous week on a similar charge, but he was then unable to do so as he was in hospital suffering from injuries received in an aeroplane accident. Connell had been a pilot in the Royal Air Force. It was contended that the offence was merely a technical one.

Mr. James Adair, depute fiscal, said the leaflets could not have caused bodily injury, but there were other ways in which harm could have been caused, as he had explained in the case of Capt. Reeve. There were possibilities of the leaflets falling in front of horses and frightening the animals. He pointed out that the regulations must be obeyed.

Sheriff Harvey imposed a fine of £5.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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Published February 24, 1921

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10,341. G. CAPRONI. Landing-carriage. (125,996.)

26,206. G. L. LANENDER. Toy aeroplanes. (158,072.)

26,757. W. J. MEAD. Planes for aircraft. (158,099.)

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